ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

NOVEMBER 1950

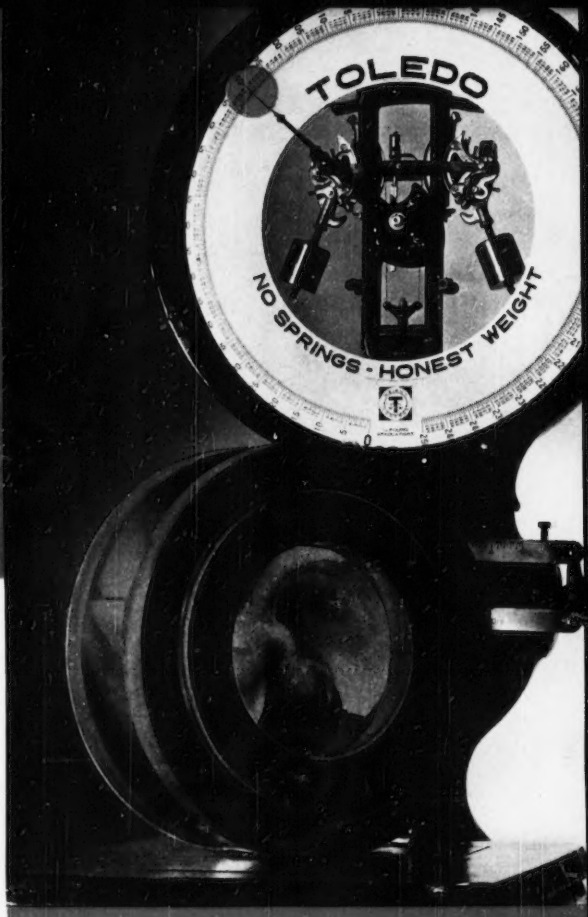
FOUNDED 1866

MASS DESLIMING IN 4-FT. CYCLONES

SEE PAGE 78

Special:- How To Deal With Government Defense Agencies . . . See page 72

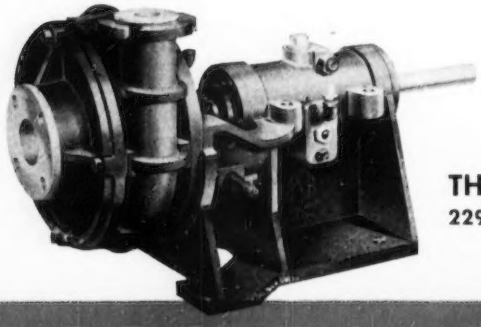
THE CHAMP WEIGHS IN ... after the fight



This Maximix Rubber Impeller tips the scales at 89¾ lbs., having lost only 1¼ lbs. in pumping 1,168,331 tons of sand. The reason: abrasives bounce off Maximix Rubber, allowing 4 to 6 times the useful life of equivalent metal parts.

FOR two and a half years, the Hydroseal Sand Pump from which this impeller was taken gave continuous service with no appreciable loss in efficiency, capacity, or head . . . and when the impeller was removed for inspection, the engineers were surprised to find that it was only slightly worn. Day in and day out, the pump had delivered approximately 325 tons of minus 20-mesh silica sand per hour in a 1650 G.P.M. solution against a static head of 14 feet. Yet, after more than a million tons, it still had plenty of service left.

Records like this have made Hydroseals the world-champions in all classes of abrasive pumping from flyweight (AA-Frame) to heavyweight (G-Frame). So don't forget . . . plant operators who demand the most from materials-handling pumps wisely choose Hydroseals.



HYDROSEALING

Clear sealing water keeps abrasives from leaking back thru the annular clearances between the rotating impeller and the stationary side plates. This reduces wear to a minimum and gives uniform efficiency throughout the life of the pump.

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SAVE ALL FOUR WAYS

with this NEW I-R Drilling Combination

1. 28% LESS AIR with the NEW DB-35 Drifter

Ingersoll-Rand's new DB-35 Drifter, with the patented double-kicker port valve, has been especially designed to increase operating economy. Tests prove that this new drifter actually requires 28% *less air* per foot of hole drilled!

2. 33% LESS TIME PER ROUND with the NEW DJB-2 Boom Jumbo

Field reports conclusively prove that, when using the new DJB-2 Jumbo, rounds are drilled out in one-third less time than with old conventional methods. This is possible because of the tremendous reduction in set-up time and spotting the drills from hole to hole.

3. 33% FEWER STEEL CHANGES with the NEW Lightweight 48-inch Aluminum Shell

The greater length of this new 48" shell permits the use of longer drill steels — with 33% fewer steel changes for a given footage. Its lightweight aluminum construction cuts shell weight almost in half! In fact, it's even lighter than the old-style 30-inch steel shell and has equal or better life. This light weight is particularly important when drilling from a column or bar.

4. 50% MORE DRILLING SPEED when Carset Jackbits are used

These longer-wearing, faster-drilling Carset Jackbits, tipped with tungsten carbide, enable you to take full advantage of the potential savings offered by the new I-R drifter combination. Often drilling speeds can be increased by 50% or more, tonnage can be boosted 20% or better, and dynamite requirements can be cut as much as 30%.

Carset Jackbits have fourteen distinct advantages. Each one of them by itself makes a significant reduction in the cost of drilling rock.

For complete information check with your nearest Ingersoll-Rand office today. Let our engineers tell you more about this new cost-cutting combination.

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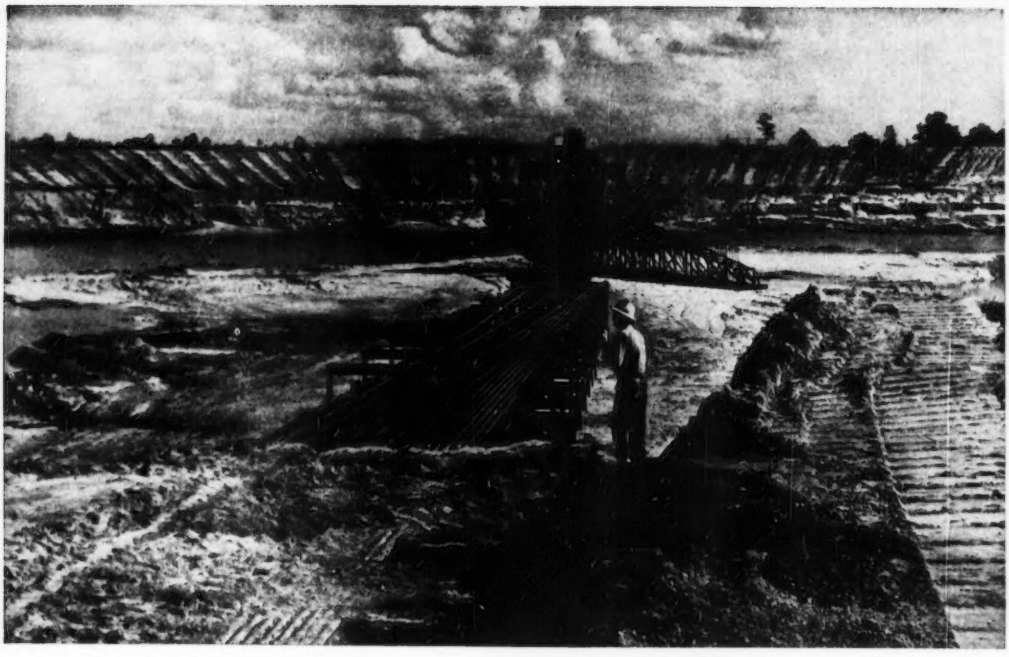

750 FOOT THICKENER 300 FOOT DORR MECHANISM

Team for economy at American Cyanamid's Sydney Mine

How to clarify 15,000 gpm of phosphate rock tailings water carrying 2% solids—on a budget? That was the problem facing the American Cyanamid Company at their Sydney Mine in 1948. Overflow had to be clear enough for reuse—underflow thick enough for practical impounding.

Our answer to the problem—based on thorough study and field testing—was the installation pictured above. A 300′ dia. special Dorr SSG Thickener mechanism, incorporating a flocculating feedwell and picket arms, installed in a 750′ dia. earthen basin with a sloped bottom. Preliminary thickening to a concentration of approximately 6% solids takes place in the outer, unswept, portion of the basin. Final thickening to 12-15% solids is effected by the mechanism in the central area.

This unusual installation—the world's largest settling basin served by a single mechanical unit—has just gone into initial operation. It is one more example of an unusual sedimentation problem solved by Dorr—the oldest manufacturer of sedimentation equipment . . . with the *newest* ideas.

Diagrammatic sketch of 300′ dia. Dorr Thickener installed in 750′ dia. earthen tank at American Cyanamid Company's Sydney Mine near Brewster, Florida.

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RESEARCH ENGINEERING EQUIPMENT

ENGINEERING AND MINING JOURNAL

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Company Offices: Publication office: 310 S. Desplaines St., Chicago 6, Ill. Editorial and Executive Offices: 330 West 42nd St., New York 18, N. Y. Cable address: McGraw Hill, New York. Branch Offices: San Francisco 4, 68 Post St.; Chicago 11, 520 N. Michigan Ave.; Los Angeles 17, 1111 Wilshire Blvd.; Washington, D. C., National Press Bldg.; Pittsburgh 22, 738-9 Oliver Bldg.; Detroit 26, 2980 Penobscot Bldg.; Cleveland 15, 1510 Hanna Bldg.; Boston 16, 1427 Statler Bldg.; Philadelphia 3, 17th and Sansom Sts.; Atlanta 3, 1911 Rhodes-Haverty Bldg.; St. Louis 8, Continental Bldg. District Managers: New York, T. E. Alcorn; New York and New England, S. Kennedy; Philadelphia, W. A. Potter; Cleveland, W. M. Spears; Pittsburgh, H. C. Chellson; Chicago, C. J. Coash; San Francisco, J. W. Otterson; Atlanta, R. C. Maultsby; Los Angeles, C. W. Dysinger; St. Louis, F. W. Roets, London address: McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C. 2, England. Cable address: McGraw-Hill, London. Other McGraw-Hill foreign news offices in Paris, Berlin, Moscow, Prague, Shanghai and Mexico City.

Subscription information: ENGINEERING AND MINING JOURNAL, November, 1950, Vol. 151, No. 11. Published monthly at Chicago, Ill. Subscription rates: United States and possessions $3 a year, $4 for 2 years, $5 for 3 years. Canada $5 a year, $8 for 2 years, $10 for 3 years. Pan American countries $5 a year, $8 for 2 years, $10 for 3 years. Elsewhere $15 a year, $25 for 2 years, $30 for 3 years. Please indicate position and company connection in all subscription orders. Price of this issue, 50 cents. Entered as second class matter August 16, 1948, at the post office at Chicago, under the Act of March 3, 1879.

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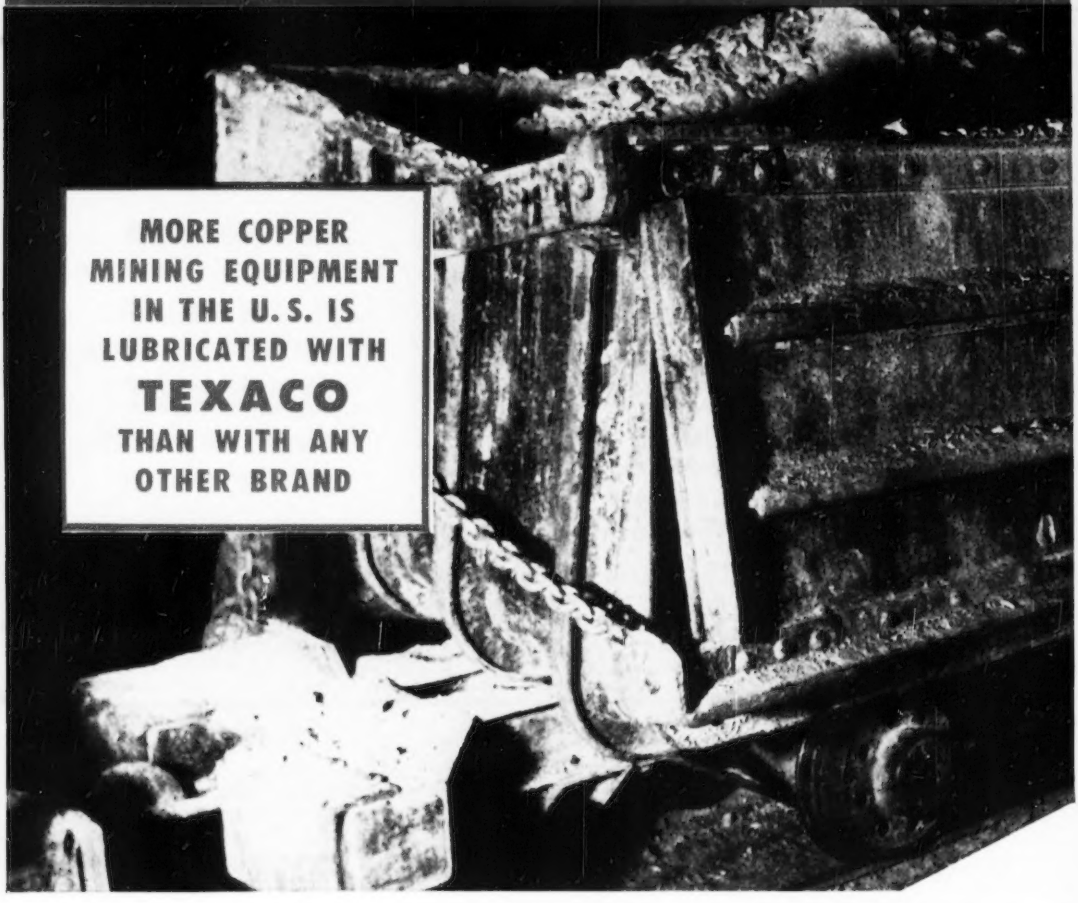
WILL IN DECEMBER



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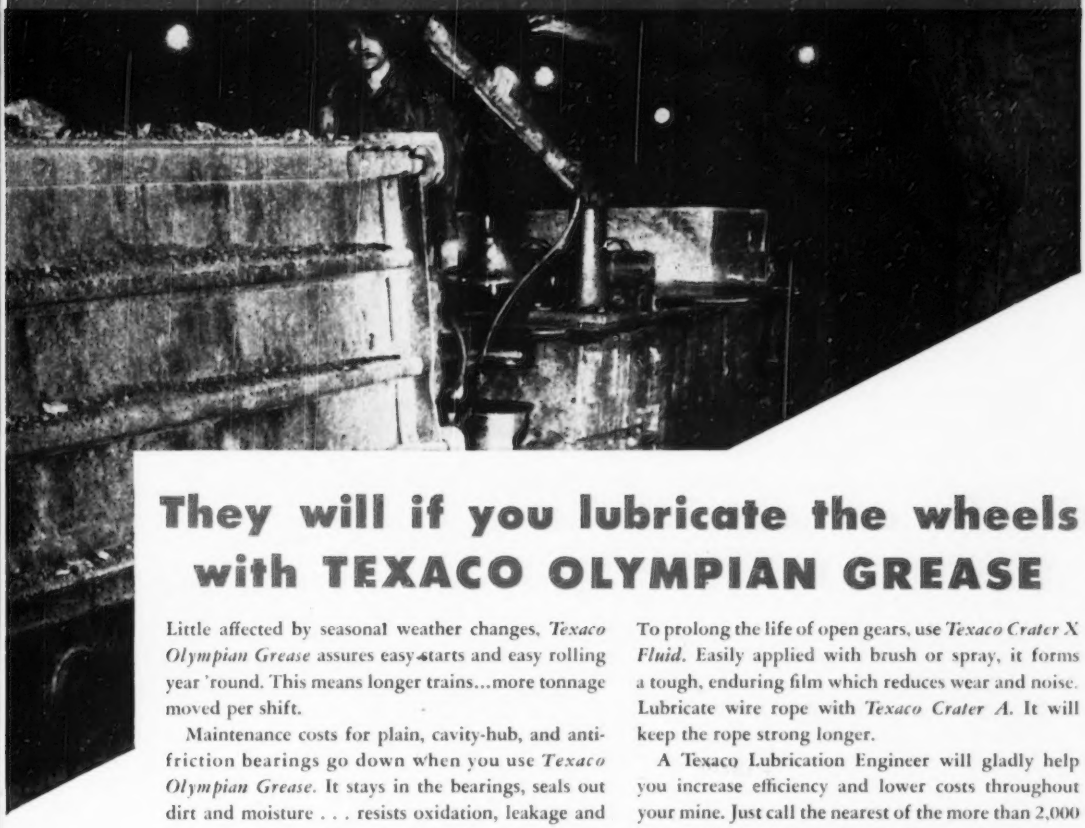
YOUR CARS START AS THEY DID IN MAY?



They will if you lubricate the wheels with TEXACO OLYMPIAN GREASE

Little affected by seasonal weather changes, *Texaco Olympian Grease* assures easy starts and easy rolling year 'round. This means longer trains...more tonnage moved per shift.

Maintenance costs for plain, cavity-hub, and anti-friction bearings go down when you use *Texaco Olympian Grease*. It stays in the bearings, seals out dirt and moisture . . . resists oxidation, leakage and separation, in service or storage. *Texaco Olympian Grease* is made in three consistencies to meet every requirement for mining equipment.

To prolong the life of open gears, use *Texaco Crater X Fluid*. Easily applied with brush or spray, it forms a tough, enduring film which reduces wear and noise. Lubricate wire rope with *Texaco Crater A*. It will keep the rope strong longer.

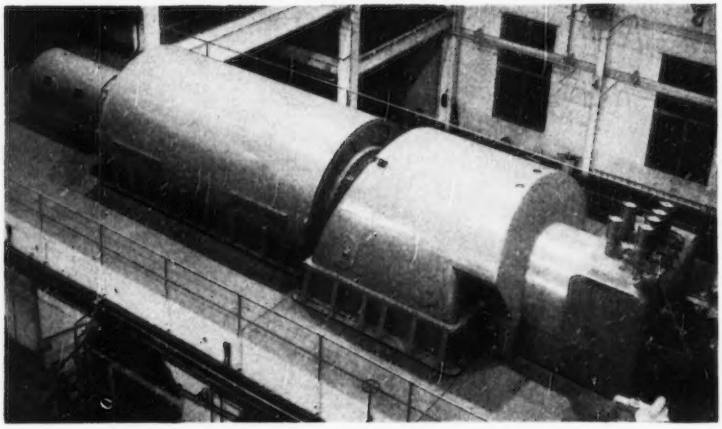
A Texaco Lubrication Engineer will gladly help you increase efficiency and lower costs throughout your mine. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

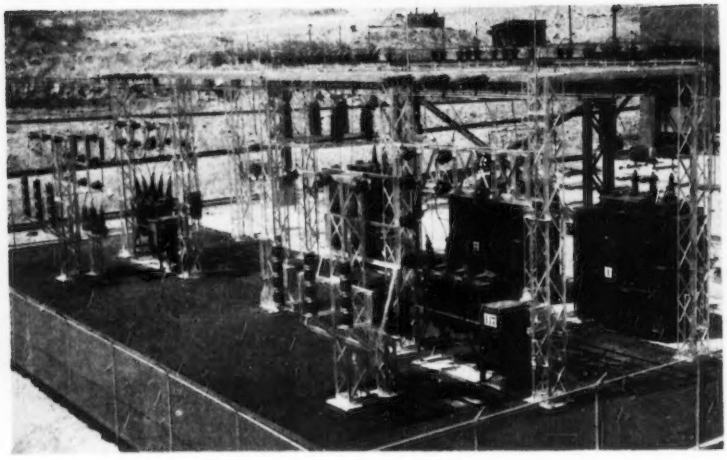
Lubricants and Fuels

FOR THE MINING INDUSTRY

Powered for low-cost high-tonnage refining!

1 Typical of the mining industry's increasing electrification to handle high tonnages at low cost is this new copper refinery at Garfield, Utah, which has a capacity of 12,000 tons of refined copper per month, with provision for expansion to 16,000 tons. Power for the refinery and other operations comes from Kennecott's power station, where three G-E steam turbine-generators (two of 25,000 kw each, plus the 50,000-kw unit shown here) generate 13.8-kv power which is stepped up to 44 kv for transmission.



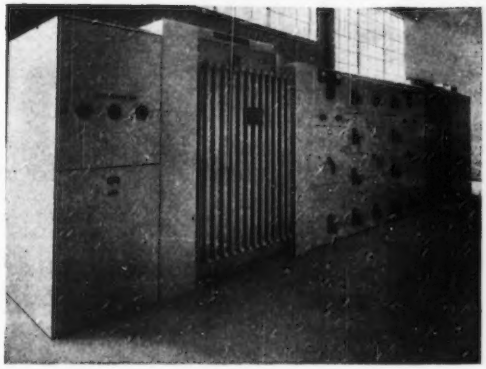


2 At the refinery, three miles away from the power plant, incoming 44-kv power is stepped down to 13.8 kv at this G-E package substation. Completely co-ordinated, it includes an outdoor steel switching structure, three 7500/9375-kva power transformers (with provision for addition of a fourth) and necessary metal-clad switchgear. G-E package substations, made in many standard combinations to fit all mining-industry needs, come in factory-built sections ready to install. They simplify ordering, save engineering time, speed installation, cut costs.

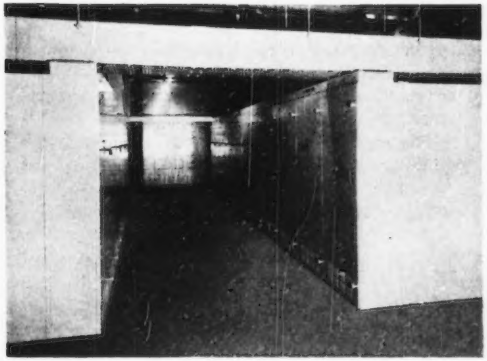
GENERAL ELECTRIC

660-20

In its new electrolytic refinery, Kennecott Copper Corporation uses this General Electric generation, conversion, and distribution equipment to help maintain production continuity

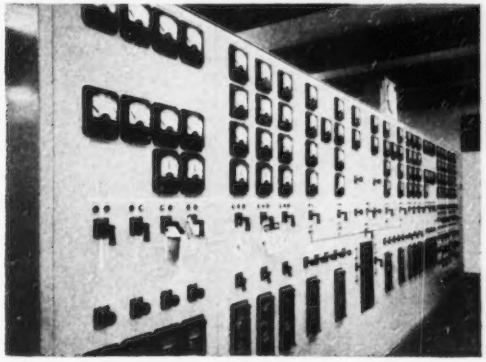


5 Four G-E 1500-kva double ended load-center substations (one shown) step down voltage from 13,800 to 480 and provide distribution at centers of load to reduce power losses.

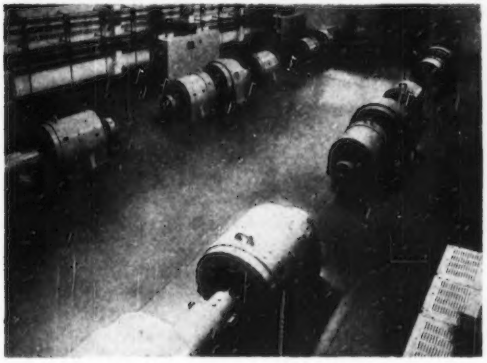


3 Inside the refinery, protecting all 13.8-kv feeders and personnel as well, is this G-E metal-clad switchgear that provides flexibility for future load changes.

6 This G-E panel — controlling package substation, a-c switchgear, and d-c power for electrolytic cell lines — helps centralize and co-ordinate plant operations.



4 A-c is converted to d-c for electrolytic cell lines by six G-E motor-generator sets, each including a 2900-hp synchronous motor and two 1000-kw, 125-volt d-c generators.

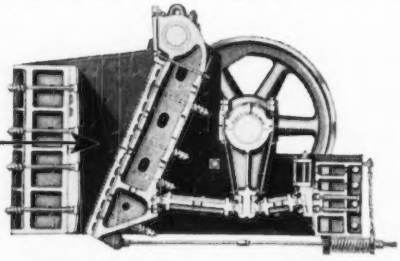


CO-ORDINATED POWER SYSTEMS
for the Mining Industry

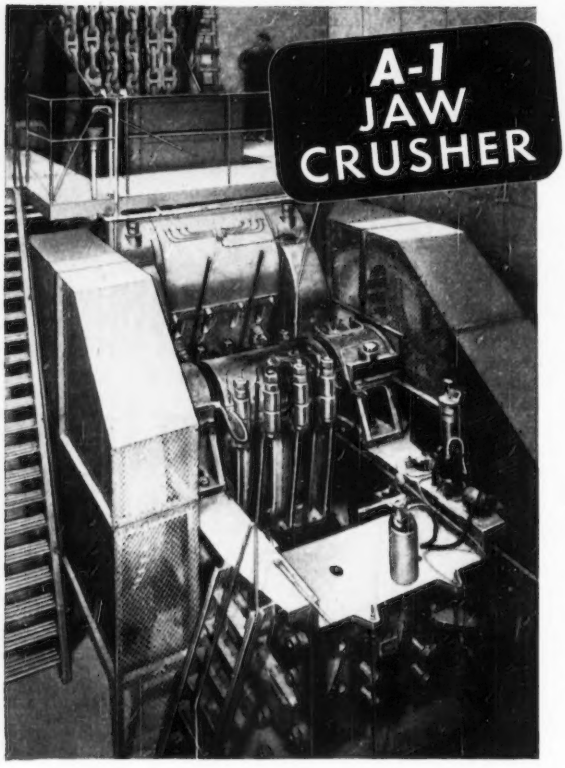
Whatever your mining or processing problem, a good man to know is the mining industry specialist in your nearby G-E office. Ask him about power-system equipment for *your* plant to protect service continuity, help boost production, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

HERE'S THE JAW CRUSHER WITH THE

DEEP



Crushing Chamber



60 x 48 A-1 Jaw Crusher Installed Abroad.

THIS IS WHAT *A-1* jaw crusher's long, deep crushing chamber (up to 35% deeper than conventional crushers) means to you in terms of crushing performance and economy:

Big capacity — full-width receiving opening with acute crushing angle carried to top of crushing chamber permits nipping the largest pieces that can enter the receiving opening.

Less slippage — long jaw opening grips feed securely at top of crushing chamber. More acute jaw angle is especially effective in crushing tough, high compressive strength materials.

Uniform wear on jaw plates — curved plates distribute crushing action over greater surface, resulting in better economy.

CONSTRUCTION FEATURES

- ★ Renewable parts protect expensive castings from wear, greatly prolong crusher life.
- ★ Automatic lubrication of main, pitman and swing jaw bearings.
- ★ Jaw plates suspended from wearing plates, permitting free expansion of manganese steel.
- ★ Sectionalized construction permits ease of handling and installation.

The Allis-Chalmers representative in your area can show you how *A-1* jaw crusher may save money in your operations. Call him, or write for **Bulletin 07B6369B.**

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IN MUD

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Stripping overburden in tough going is duck soup for this "Cat" D8 Tractor with No. 80 Scraper.

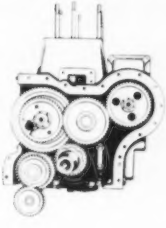
WHEN you're working on a bid, you can figure a minimum of down-time and maintenance costs with "Cat" Diesel Tractors. Dependability is *built* into these big yellow machines. They deliver pay-off performance even under rugged conditions. And your nearby "Cat" dealer is on call 24 hours a day for fast service.

Here's a typical example of "Cat" equipment on the job. The McGeorge Contracting Co., Pine Bluff, Ark., relies on a "Cat" fleet for stripping overburden on the Reynolds Mining Co. holdings at Bauxite. The bauxite ore is covered by 80 feet of tough clay and lignite. Working on 1,500-foot one-way hauls, each "Cat" team—a D8 with a No. 80 Scraper—averages 4 trips an hour with 15 pay yards per trip. Each team delivers 60 pay yards per hour to the fill. In all, McGeorge has 25 "Cat" D8 and D7 Tractors in its fleet. It also uses them on highways and levees.

Ask any user about "Caterpillar" equipment. Ask your "Cat" dealer for further facts. Between the two, you'll learn beyond a question of doubt what kind of a job "Cat" equipment can do for you!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

LOOK UNDER THE HIDE



Pressure-lubricated "Caterpillar" timing gears are of wide-faced, helical design. Select steels and heat treatment methods are carefully matched to the type of service expected. Timing gears are upset forged . . . turned, shaped and shaved to average within 50-millionths of an inch of true surface smoothness. Look under the hide for "Caterpillar" quality. You'll find it in every detail.

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MOTOR GRADERS
EARTHMOVING EQUIPMENT

NO-TURN shuttle haul . .

Dumptors®

SAVE TURN TIME GAIN HAUL TIME

On every haul cycle, Koehring fast-shuttling Dumptors eliminate slow turns — at the loading unit, at the dumping point, on sharp, "zig-zag" grades. They gain *more* productive haul time, because Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse. Here's how much no-turn shuttle operation can increase your production:

By eliminating only 2 turns on a 1,000' haul, time studies prove that Dumptors can save 30 seconds every round trip, and increase hourly yardage output over 10% per unit. What's more — fast, easy spotting and 1-second gravity dump keep production high.

Remember, too — top hauling efficiency also means increased shovel output. For *double profit protection*, team fast-shuttling Dumptors with Koehring heavy-duty excavators. Four sizes: ½-yd., ¾-yd., 1½-yd., and 2½-yd.

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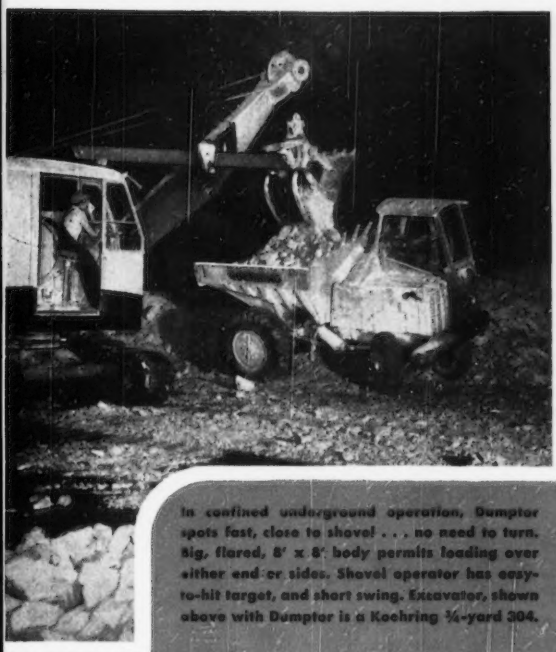
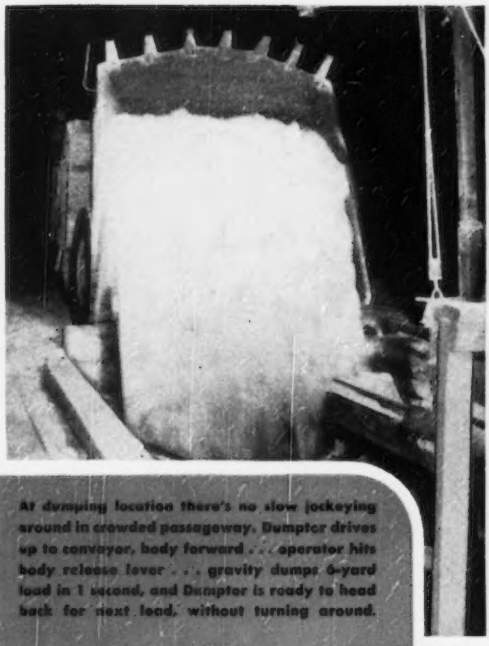
R16

. . in open pits or underground



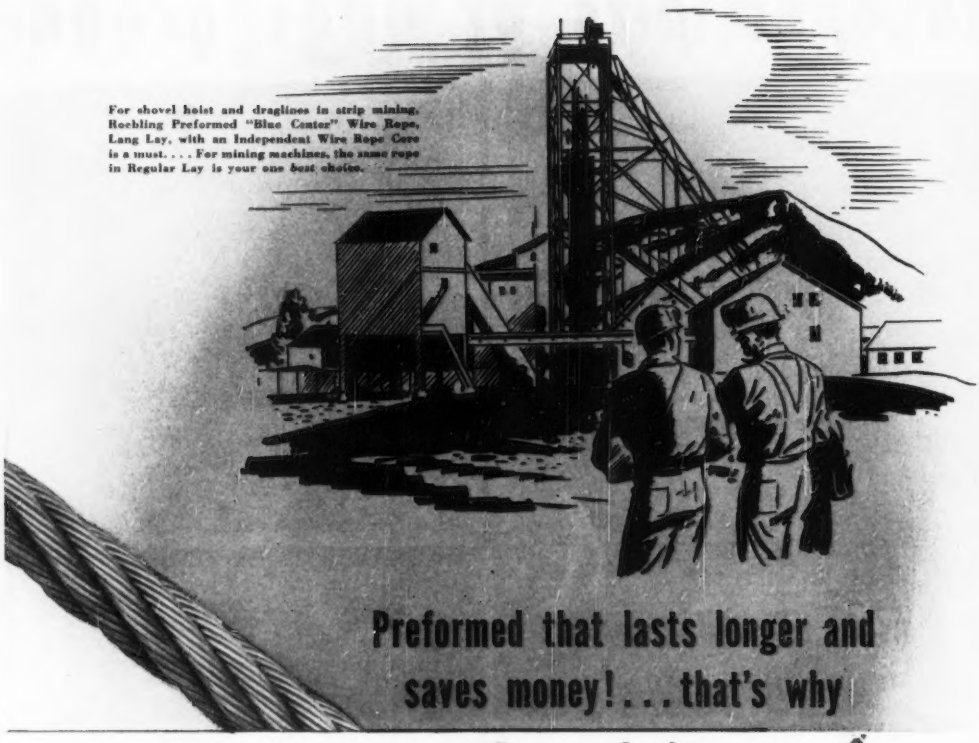
In confined underground operation, Dumptor spots fast, close to shovel . . . no need to turn. Big, flared, 8' x 8' body permits loading over either end or sides. Shovel operator has easy-to-hit target, and short swing. Excavator, shown above with Dumptor is a Koehring ¼-yard 304.



At dumping location there's no slow jockeying around in crowded passageway. Dumptor drives up to conveyor, body forward . . . operator hits body release lever . . . gravity dumps 6-yard load in 1 second, and Dumptor is ready to head back for next load, without turning around.

On no-turn shuttle haul, from underground mine to surface crusher, loaded Dumptor leaves narrow tunnel in the same travel position as it entered. Heavy-duty, constant-mesh transmission gives same fast speeds in either direction. Dumptors climb 24% grades fully loaded.

There's no unproductive turning time . . . no waiting for slow body hoists. Gravity dump never balks . . . never wears out . . . eliminates body hoist mechanism. Dumptors also save costly spring maintenance with one big double-coil chassis spring on steering axle.



For shovel hoist and draglines in strip mining, Roebling Preformed "Blue Center" Wire Rope, Lang Lay, with an Independent Wire Rope Core is a must. . . . For mining machines, the same rope in Regular Lay is your one best choice.

Preformed that lasts longer and saves money!...that's why

Today it's Roebling!

YOU WANT ROPE that's *extra* tough, *extra* strong, *extra* long-lived! And you *get* these extras in Roebling Preformed "Blue Center" Wire Rope, for "Blue Center" steel has completely superior resistance to abrasion, shock and fatigue. Roebling developed and is the only maker of "Blue Center" steel . . . and Roebling research, workmanship and modern, precision machines are your added assurance of rope quality that pays off.

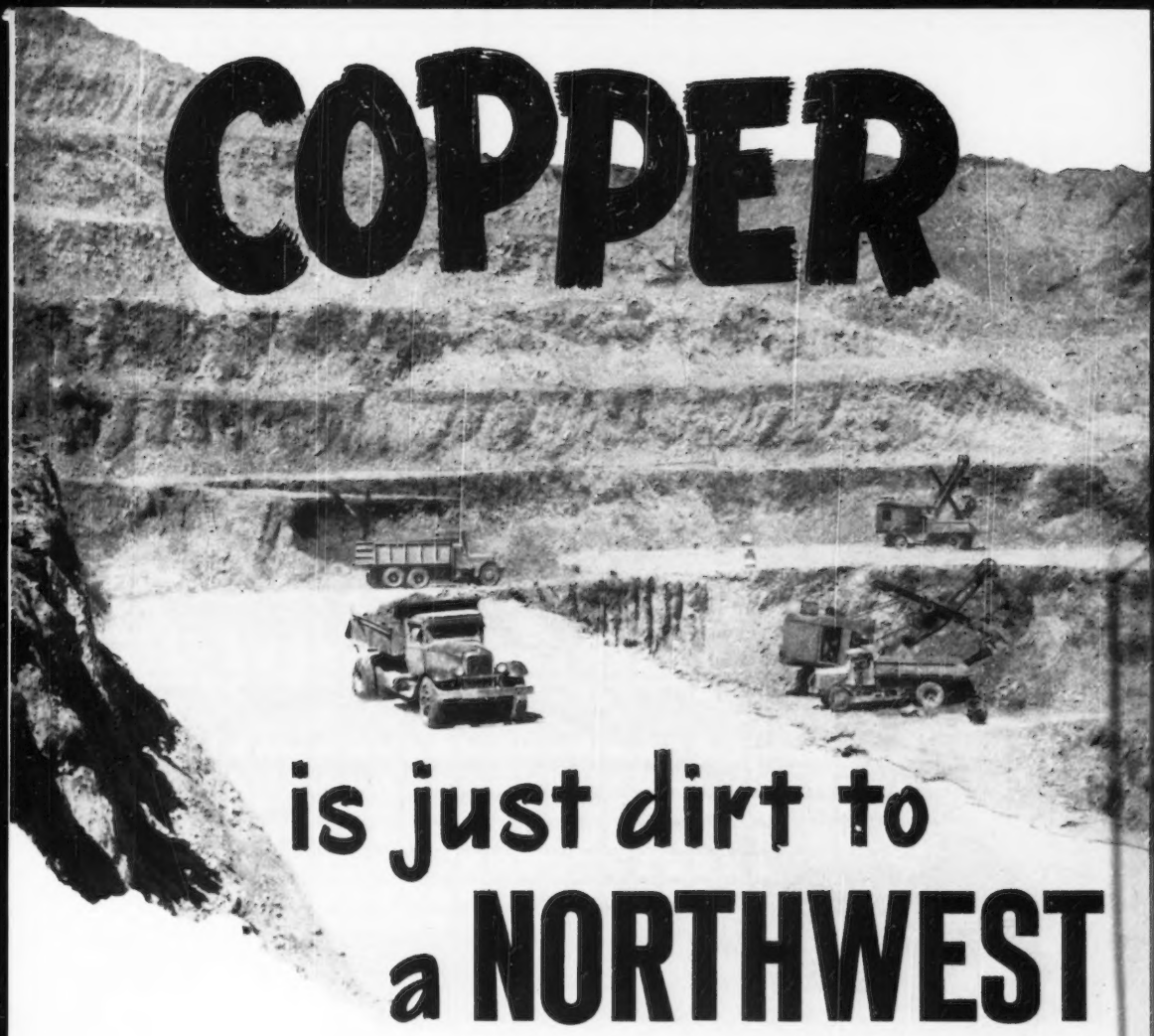
But for everything wire rope can give, be sure to get Preformed. Roebling Preforming makes rope easier to handle and install. It can be cut without seizing. It spools better . . . is not inclined to set or kink . . . minimizes vibration and whipping.

There's a Roebling wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field Man tell you which rope will give the best and the lowest-cost performance for every installation. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

A CENTURY OF CONFIDENCE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Road ★ *Cincinnati*, 3253 Fredonia Ave. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 4801 Jackson St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. Twelfth St. ★ *Portland*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 Seventeenth St. ★ *Seattle*, 900 First Ave. S.



is just dirt to a NORTHWEST

And, so is every other kind of digging whether it is Rock or Loam. If you have a real Rock Shovel you are assured of output in any digging.

Here are three Northwests in one of the largest copper pits in the world keeping the trucks on the move. They are proving the value of such Northwest advantages as Northwest Positive Traction, the "Feather-Touch" Clutch Control, the Northwest Cushion Clutch, Northwest Dual Independent Crowd and Northwest Simplicity of Design that makes upkeep easy and reduces "down time." These things are proving out in mining and hard rock work.

If you are planning modernization, expansion or additions in your pit you will find that Northwest advantages will speed up your output and cut your pit costs. Why not plan now for a fully Northwest equipped pit? We'd like to tell you more about Northwest Advantages and what Northwests are doing for other mining properties.

NORTHWEST ENGINEERING COMPANY
1509 Field Building, 135 South LaSalle Street, Chicago 3, Illinois

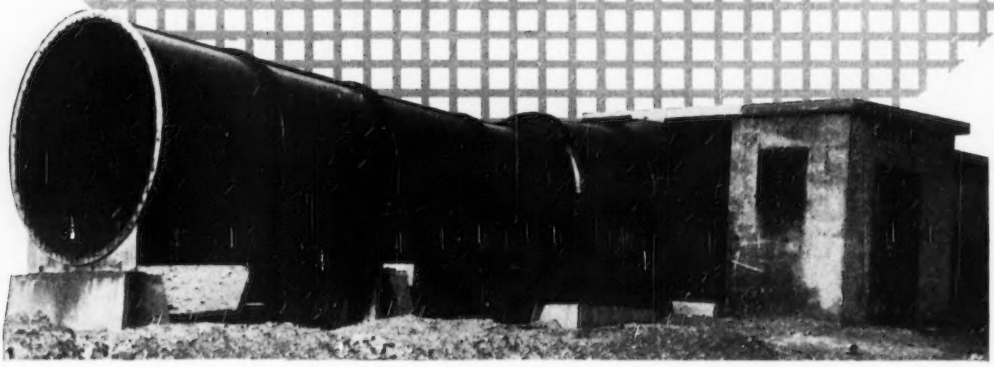
NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

JOY

AXIVANE® FANS

Do ALL your Ventilating Jobs MORE EFFICIENTLY!



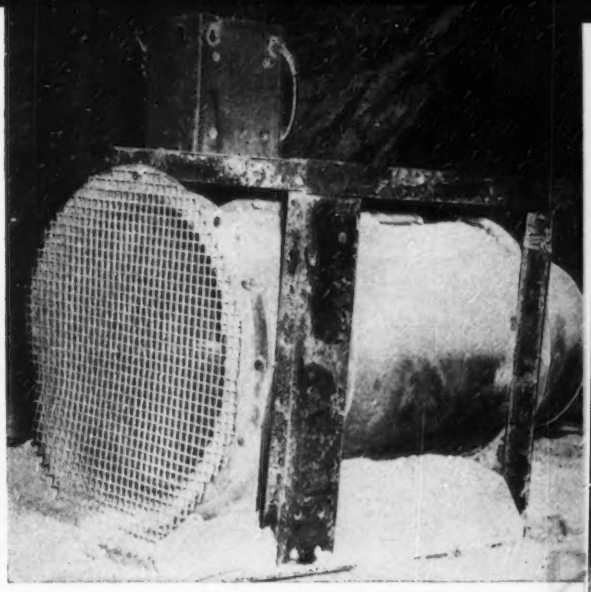
FOR MAIN VENTILATION—

JOY AXIVANE MINE FANS—the only fan with Simultaneously Adjustable Blades.

In the long run, you can count on more air at considerably lower overall cost with a JOY AXIVANE Mine Fan on the job. They're designed for lower speed operation and that means reduced maintenance and depreciation costs, because service life is increased and lubrication is simpler and more foolproof at lower speeds. What's more, you'll cut power costs with JOY's wide range of blade adjustment and simultaneously adjustable blades, giving you the highest possible efficiency over the widest possible operating range and eliminating guesswork settings. ● No matter how your air demand changes, you can always keep a JOY Fan at top efficiency. *Let us survey your ventilation problem—no obligation.*

FOR SECONDARY VENTILATION—

JOY Series 1000 AXIVANE FANS with Standard Adjustable Blades.

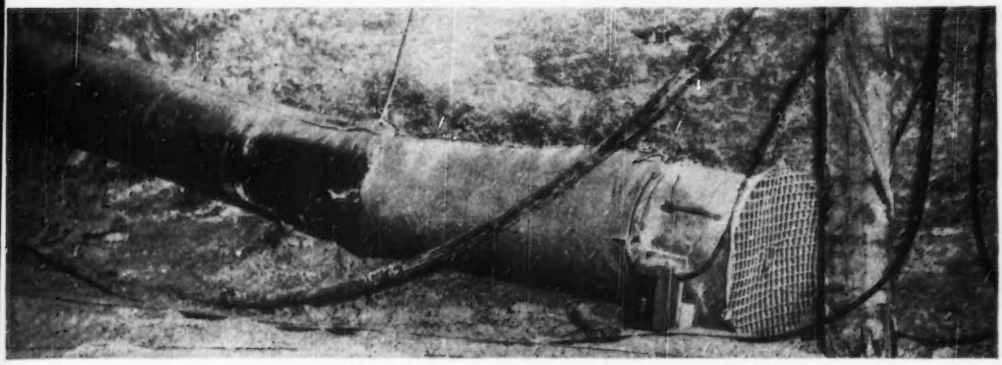


For smaller volumes, or where you may need additional capacity in a more or less permanent installation to supplement main ventilation, you'll find JOY Series 1000 AXIVANE Fans ideal. The vaneaxial design was pioneered by JOY in mine ventilation equipment. Series 1000 FANS are compact and space-saving, easy to handle and install, and relatively quiet in operation. They are the only fans in their class with adjustable blades as standard equipment, for your easy maintenance of peak efficiency over a wide range of air supply requirements.

FOR AUXILIARY VENTILATION—

JOY AXIVANE BLOWERS for either low or high pressure duties.

JOY AXIVANE Portable Blowers are all-purpose, two-in-one units. They not only provide smoother air flow and require minimum power, but operate with unmatched efficiency through any length of tubing. You don't need two types of blowers for different sections of the mine—JOY AXIVANE Blowers are suitable for either high or low pressure service. Available in types and sizes to meet every portable air supply requirement, and in electric or air-operated models.



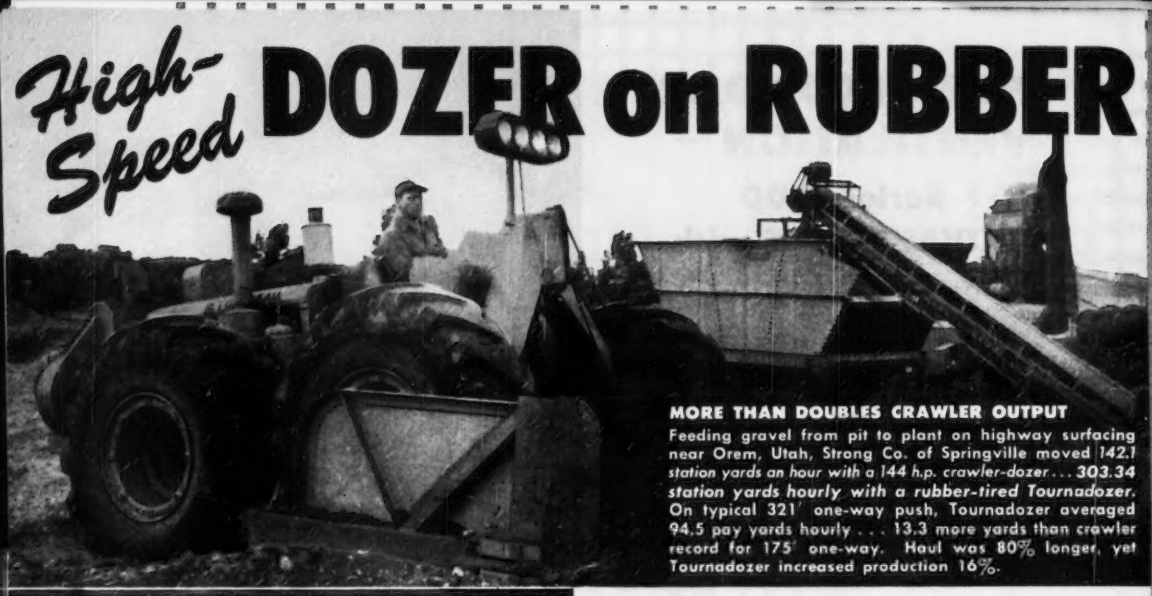
Write for Bulletins, or *Consult a Joy Engineer*

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

High-Speed DOZER on RUBBER



MORE THAN DOUBLES CRAWLER OUTPUT

Feeding gravel from pit to plant on highway surfacing near Orem, Utah, Strong Co. of Springville moved *142.1 station yards an hour with a 144 h.p. crawler-dozer . . . 303.34 station yards hourly with a rubber-tired Tournadozer.* On typical 321' one-way push, Tournadozer averaged 94.5 pay yards hourly . . . 13.3 more yards than crawler record for 175' one-way. Haul was 80% longer, yet Tournadozer increased production 16%.

STRIPS PIT ROCK

To stockpile lime rock at their oceanside pit, Troup Bros., Inc. of Miami, Florida digs rooted coral to a depth of 8 or 10 ft. . . . then rolls material through seepage pools and up steep grades to crusher. It's tough going all the way, but Tournadozer delivers 60 to 80 yds. hourly over 200 ft. cycles. With 19 m.p.h. forward speeds, constant-mesh transmission, and high reverse speeds, rubber-tired Tournadozer makes up to 24 trips an hour.

STOCKPILES COAL

At Willow Run, Michigan, Kaiser-Frazer Corp. has been using a C Tournadozer for over a year to stockpile coal and feed plant conveyor. In a typical day, the rubber-tired "C" delivers 300 tons to conveyor, and moves 600 tons over 300' distance from cars to stockpile. According to Supt. C. P. Olsen, Tournadozer has been 90% efficient in 2100 hours of operation. "It's entirely reliable," he reports, "and of great importance to our day-to-day job."

CLEARS, GRADES, FOR RAILROADS

In the Central Province of India near Chandi, the Great Indian Peninsular Railway built a mile-long railroad siding through dense jungle. One Tournadozer tossed aside tangled undergrowth, removed trees, stripped topsoil . . . and then handled all preliminary rough grading in rock and hard black clay. Entire 23,000-yard job was completed well ahead of schedule by the versatile Tournadozer and a self-loading, 7-yard D Tournapull.

LETOURNEAU PEORIA, ILLINOIS — JOB-PROVED The World Over — **TOURNADOZERS**

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

gets more work done

See for yourself how much more profit you can make on pushing, pulling, or dozing assignments with a new job-proved C Tournadozer. This powerful dozer "*runs*" on giant 21.00 x 25 low-pressure tires at speeds up to 19 m.p.h. . . . works in mud, sand, or snow which would stall ordinary crawlers . . . drives on-the-job or from job-to-job over paved highways or cross-country. Tournadozer eliminates the need for trailers or time-consuming blocking. It goes anywhere, any time . . . keeps working and earning even during normal shutdown seasons. With either its standard bulldozer blade, or any of 9 auxiliary tools, Tournadozer's high-speed, 4-wheel drive on rubber, and fast, easy electric controls will pay off by getting more work done. For proof, check the actual job performances shown here . . . then see your LeTourneau Distributor for complete facts . . . or write for LeTourneau Bulletin *TODAY!*

PUSH-LOADS SCRAPERS

Nello L. Teer Co. of Durham, N. C., used C Tournadozer with four 13.5-yd. C Tournapulls to help build a 450,000-yd. swamp fill for new Washington-Annapolis expressway. Tournadozer pusher-loaded 12 pay yards of silt-sand into each Tournapull in as little as 15 to 30 seconds. Tournadozer also push-loaded crawler-scraper rigs on second cut 1½ miles away . . . shuttling back and forth between the 2 cuts several times a day.

PULLS EQUIPMENT

Skidding heavy electric cable boat for stripping shovel is one of many maintenance tasks Tournadozer handles 24 hours a day, 7 days a week around a Mesabi iron mine near Keewatin, Minnesota. The "C's" big diesel engine and 4-wheel drive on giant 21.00 x 25 low-pressure tires provide plenty of drawbar pull to add extra profits as a prime mover for Rooters, Carryall, Scrapers, Sheep's foot rollers, plows, and other heavy equipment.

PLOWS SNOW

When deep drifts covered large areas in Manitoba, Canada, last winter, one Rural Municipality equipped their C Tournadozer with a LeTourneau 12'3" x 6'6" V-type snow plow. Temperatures reached 34° below zero . . . drifts were 3 to 8 ft. deep, some almost solid ice . . . yet in 142 working hours, Tournadozer cleared over 600 miles of roads and farm lanes in the area. Rubber tires prevented damage to highway surface.

Tournadozer, Tournapull, Carryall, Angledozer, Buster—Trademarks Reg. U.S. Pat. Off. C13

To: R. G. LeTOURNEAU, Inc., Peoria, Ill.—We may be in market for one or more C Tournadozers. Please send information on this powerful 4-wheel-drive prime mover for use with:

Name..... Title.....
Company.....
Street..... City, State.....
Type of work.....

- ☐ Bulldozer
- ☐ Angledozer
- ☐ Carryall Scrapers
- ☐ Logging Winch
- ☐ Tree Pusher
- ☐ Snow Plow
- ☐ Side Crane
- ☐ Rooters
- ☐ Rollers
- ☐ Root Rake

LeTOURNEAU LET

BONUS YARDAGE EVERY SHIFT

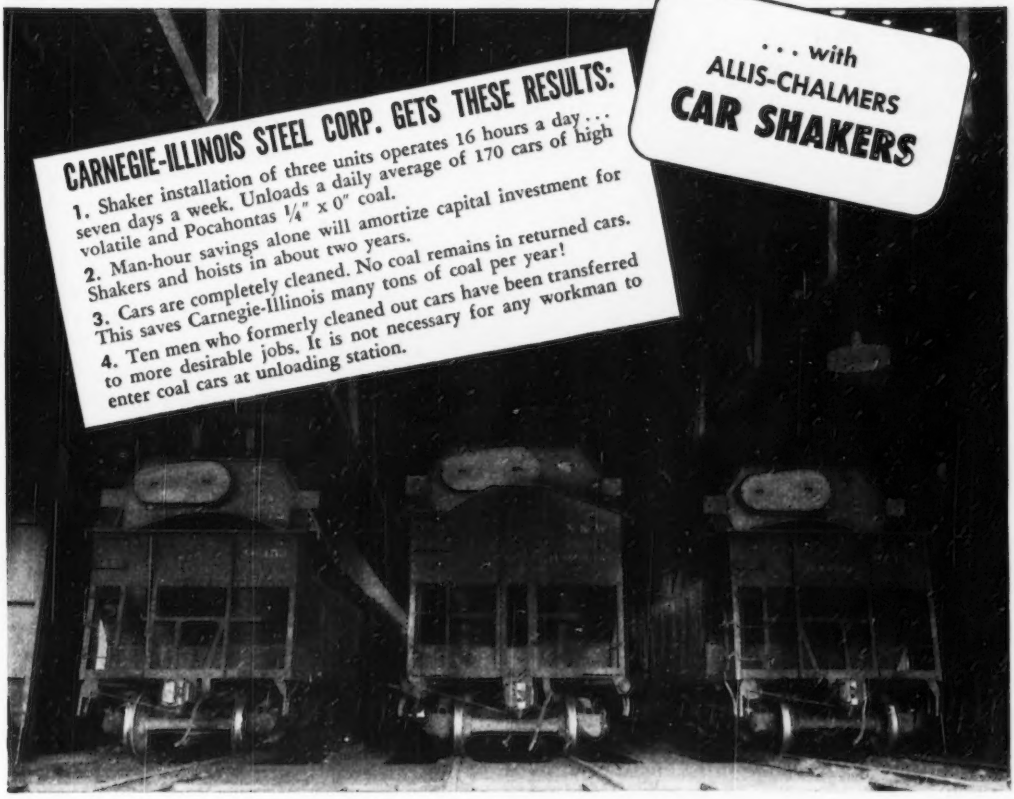
DIGGING overburden that averages 22 feet in depth, and mining a 10-foot bed of Florida phosphate rock, this Bucyrus-Erie 650-B walking dragline is on the job 24 hours a day, seven days a week. Its ability to keep working month after month, through fair weather or foul, has been reflected in the "bonus yardages" that set outstanding production records.

Big dependable yardages are an old story to owners of Bucyrus-Erie stripping shovels and draglines. Owners know that fast, smooth operating cycles combined with on-the-job reliability mean extra output every shift . . . that sound, *years ahead* design and durable construction mean dependability that takes years of hard service in its stride. 98L50

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

STEEL MILL UNLOADS 170 Coal Cars Daily!


CARNEGIE-ILLINOIS STEEL CORP. GETS THESE RESULTS:
1. Shaker installation of three units operates 16 hours a day . . . seven days a week. Unloads a daily average of 170 cars of high volatile and Pocahontas ¼" x 0" coal.
2. Man-hour savings alone will amortize capital investment for Shakers and hoists in about two years.
3. Cars are completely cleaned. No coal remains in returned cars. This saves Carnegie-Illinois many tons of coal per year!
4. Ten men who formerly cleaned out cars have been transferred to more desirable jobs. It is not necessary for any workman to enter coal cars at unloading station.
. . . with
ALLIS-CHALMERS
CAR SHAKERS

YOU CAN GET SIMILAR SAVINGS in demurrage charges and man-hours by installing an Allis-Chalmers Car Shaker. And you save with safety! Accidents are eliminated as workmen do not have to mount the car during the automatic unloading operation.

The Shaker is driven by a 15 hp, high torque, integrally enclosed Allis-Chalmers motor — mounted on rubber to protect motor from severe vibration.

For complete information on how the Car Shaker can help *you* save time and money, contact your nearby A-C Sales Office. Or write for Bulletin 07B7221.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

Please send Car Shaker Bulletin 07B7221.

Name .....

Title .....

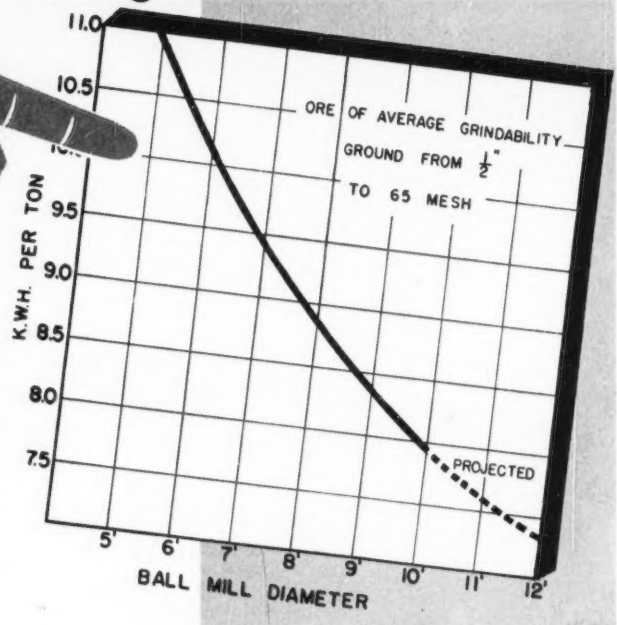
Firm .....

Address A-3171

ALLIS-CHALMERS

HERE'S PROOF...

Power Consumption Varies With Grinding Mill Diameter!



To show you what happens to power costs with a change in mill diameter, here are data averaged from actual reports from commercial operators over a period of years. Note that power consumption per ton of feed is roughly in inverse proportion to mill diameter. **You cannot compare mills of different diameter on the basis of equal power.**

Size for size, MARCY low pulp line ball and rod mills have been proved to have greater capacity than grinding mills of any other type, with corresponding savings in power per ton of finished product and generally better metallurgical results. Ask our engineers to analyze your grinding problems without cost or obligation to you.

OTHER PRODUCTS

Massco Fahrenwald Flotation Machines; Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Density Controllers; Belt Feeders; Pinch Valves; Assay and Laboratory Supplies and Equipment; Complete Milling Plants; Constam Ski Lifts.

THE **Mine & Smelter** SUPPLY COMPANY

Main Office: DENVER, COLO., U.S.A.; El Paso; Salt Lake City; 1775 Broadway, New York, N.Y.

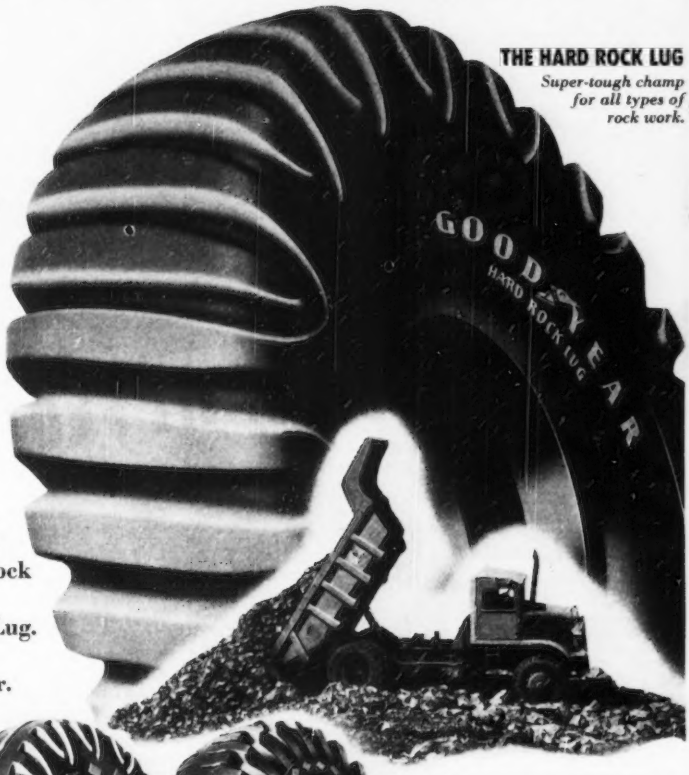
Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P. I.; The Ore & Chemical Co., 80 Broad St., New York 4, N.Y., for Continental Europe.

TOUGH in tread
TOUGH in body
for the TOUGHEST jobs you have!

THAT'S Goodyear's Hard Rock Lug Tire. Extra-thick undertread protects its extra-tough carcass against bruising—extra-heavy tread and sidewalls are armored against cuts and rips by massive lug bars—self-cleaning tread provides outstanding traction.

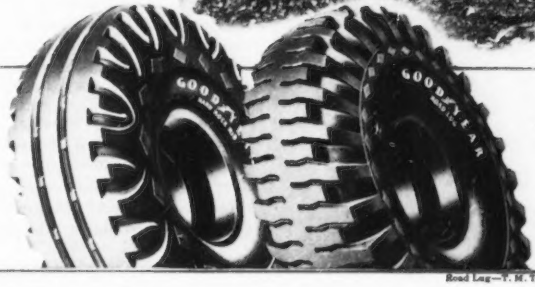
With all these *extras* built into it, no wonder quarry operators say Goodyear's Hard Rock Lug has no equal for cutting costs on tire-killing rock work!

If you'd like to cut *your* rock hauling costs right down to rock bottom, ask your Goodyear dealer about the Hard Rock Lug. You'll see why *it pays* always to BUY and SPECIFY Goodyear.



THE HARD ROCK LUG
Super-tough champ for all types of rock work.

THE HARD ROCK RIB
Companion tire for front wheels in rock work—easier steering, smooth rolling, same cord body, same shoulder and sidewall as Hard Rock Lug.



THE ROAD LUG
Remarkable dual-purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

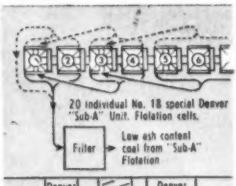
GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

FOR COMPLETELY FLEXIBLE FLOTATION RESULTS USE THE

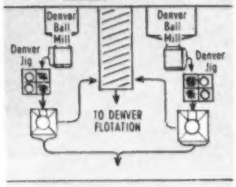
DENVER "SUB-A" UNIT FLOTATION CELL

Roddymoor Coal Flotation England*



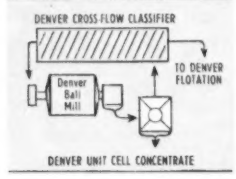
Extreme flexibility is provided by using Denver "Sub-A" Unit Flotation Cells. Mr. H. Nelson of England's National Coal Board, says, " . . . *Denver Flotation Cells have proved ideal for our purpose; being flexible enough to allow almost any combination of flows, and extremely low in maintenance costs.*"

Coarse Gold From Grinding Circuit



Free gold and gold associated with chalcopyrite, are much easier to float in a dense pulp, easily maintained in a Denver Unit Flotation Cell. Such high densities in subsequent flotation circuits cannot be satisfactorily handled, thus making even more desirable the recovery of coarse values in the grinding circuit.

Slime Loss Reduced in Copper Plant



Decreasing slime loss in copper circuit is the function of this Denver "Sub-A" Unit Cell. Recovery of copper at a coarse size eliminates overgrinding and resulting slime losses. Combined concentrate of Unit Cell and subsequent "Sub-A" Flotation gives higher average grade as well as higher total recovery.

**Read this complete story in May-June, 1950, Deco Trefoil.*

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

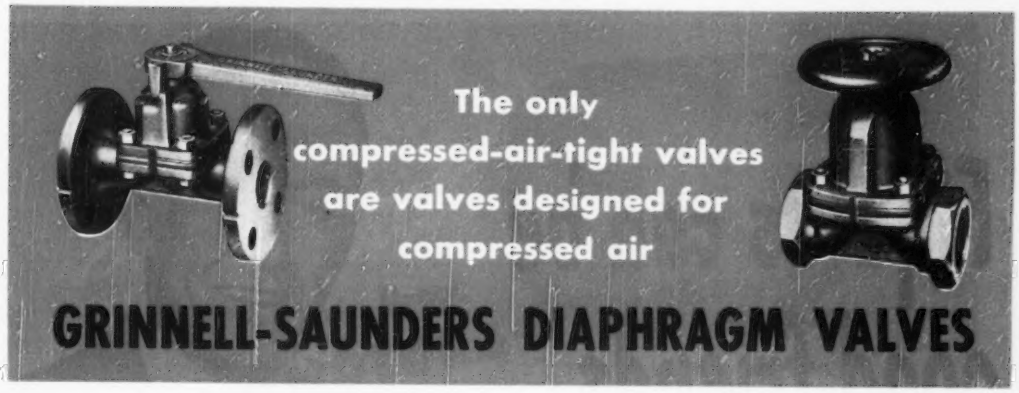
FLOTATION ENGINEERS

All your process equipment needs . . . from *Testing to Feeder to Dryer* . . . are available. Write, wire or phone for complete information.

"The firm that makes its friends happier, healthier and wealthier"

DENVER • NEW YORK • CHICAGO • EL PASO • VANCOUVER • TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG • RICHMOND

DENVER EQUIPMENT COMPANY, 1402 17th St., Denver 17, Colorado



Invented by a mine engineer to stop air leaks. A rubber diaphragm seating on metal gives positive closure, even when scale is lodged on the weir. At the same time, working parts are isolated from the air lines so that no packing glands are needed, no stem leaks are possible. That was the idea behind the Grinnell-Saunders Diaphragm Valve. As one engineer said, "When about a third of your air compressors are just pumping air out through leaks and this diaphragm valve eliminates the leaks, cutting out one-third of your air costs, why you've really got something."

Diaphragm gives leak-tight closure against grit, scale, solid matter. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum. You can't keep scale out of compressed air lines but tests prove that Grinnell-Saunders Diaphragm Valves give perfect closure when scale up to 1 6" diameter is trapped in 1" valves and up to ¼" solids in larger valves.

No "freezing", no clogging, because all working parts are sealed off from compressed air and moisture.

Friction loss reduced by streamlined flow in both directions. Diaphragm lifts high to give unobstructed passage. Friction coefficient remains practically constant throughout range of valve sizes.

Inexpensive maintenance without removing valve from line. Diaphragm is only part that normally wears and needs replacement. Often lasts for years since compressor and finger plate support it in all positions. Quickly, easily replaced without removing valve from line. No refacing, no disc holder, no packing glands.

Self-financing through compressed air savings. This table from "Compressed Air Data Book" shows how fast you can pay for Grinnell-Saunders Diaphragm Valves out of the compressed air savings, and, perhaps, avoid the purchase of larger compressors.

Size of opening inches	Cu. ft. wasted per month at 100 lbs. pressure based on nozzle co-efficient of .65	Cost of waste per month based on 6 cents per 1000 cu. ft.
3 8	6,671,890	$400.31
1 4	2,920,840	175.25
1 8	740,210	44.41
1 16	182,272	10.94
1 32	45,508	2.73

Diaphragms, body and lining material to meet all conditions. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum (other materials on special order). Linings of lead, glass, natural rubber or neoprene. Diaphragm materials, natural rubber or synthetics. Write for the Grinnell-Saunders Diaphragm Valve Catalog.

GRINNELL

Grinnell Company, Inc., Providence, R. I. Branches: Atlanta • Billings • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Pocatello • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Figures can be good friends of yours

They can tell you, for instance, whether your wire rope is giving you a big dollar's worth . . . whether it's a bargain in the true sense of the word.

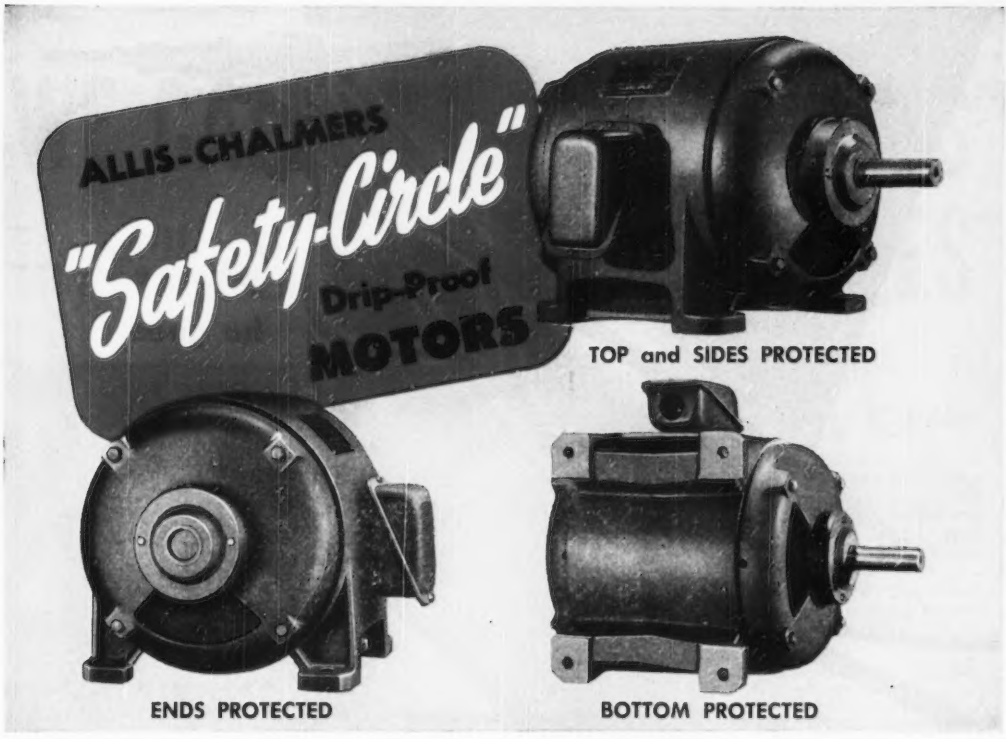
They can tell you the total amount of work it does in its life, and the cost per unit of work—the only *true* cost. Bethlehem strongly suggests you keep figures on wire-rope performance, so that you will know at all times which brand of rope is doing the best, most economical job for you.

Obviously, we feel that Bethlehem rope will stand out in any such comparisons. We welcome comparisons as a means of proving the basic economy of Bethlehem rope—economy every user can prove with a simple system of records.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor: Bethlehem Steel Export Corporation

LET YOUR RECORDS TELL YOU!



Get All-Around Motor Protection with

SAFETY-CIRCLE

THAT SOLID CAST IRON FRAME protects *Safety-Circle* working parts against physical damage from every angle. The completely enclosed bottom provides extra protection and extra strength. End brackets are drip-proof at no premium.

Because the frame is cast iron, it is resistant to rust and corrosion. It withstands physical abuse and will not distort.

Protected Inside, Too

Safety-Circle protects against internal breakdown with multiple-dipped and baked stator and die-cast aluminum rotor. *Ball bearings are factory-lubricated and need no attention for years.* Wide open internal construction and large fans keep temperatures well within rated limits.

Don't be satisfied with a motor that gives you less than full protection. Insist on the extra protection of *Safety-Circle.*

For complete details on *Safety-Circle* advantages, see your A-C Authorized Dealer, Sales Office, or write for Bulletin 51B6210B. Sizes from 1 to 20 hp, 326 frames and smaller.

A-3145

Safety-Circle, Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

FL2 Air Feed Leg Mounting an S48 Sinker

wherever he goes there's

SPEED

with the

NEW GARDNER-DENVER FL2 AIR FEED LEG MOUNTING

Small headings — sub-levels — hard-to-reach stopes — can now be drilled faster — with the new Gardner-Denver FL2 Air Feed Leg Mounting for sinker drills. Weighing only 42 pounds* — the FL2 is easily carried into remote workings — gives your runners these time-saving advantages:

- **faster setup** — easily and quickly attached to the drill.
- **easy collaring** — with stoper-type controls.
- **longer steel changes** — when used with carbide bits.
- **fast drilling** — ample feed power, under positive control.
- **faster tearing down** — a simple twist detaches feed leg from drill.
- **extra long travel** — three feed travel lengths available: 36", 48" and 60". Extension leg adds an extra 24" for deeper holes.

**42 pounds for 36" feed travel.*

Write today for complete information.

the NEW Gardner-Denver S48 Sinker

45-pound companion to the FL2

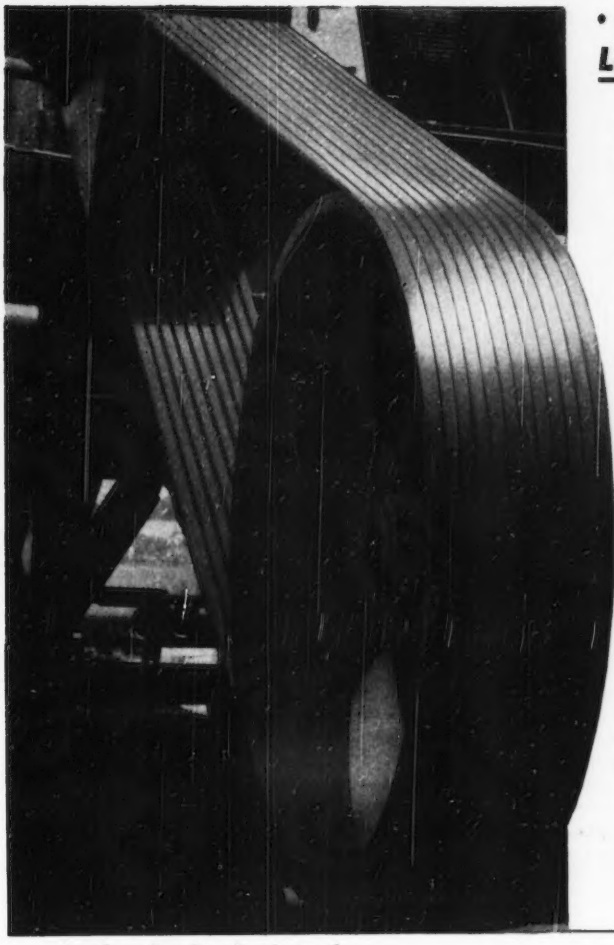
- equals most 55-pound drills in speed and power.
- quickly changed to wet, dry or automatic wet.
- shorter over-all length.
- simple, effective steel puller — easily operated by foot or hand, assembled without wrenches.

GARDNER-DENVER *Since 1859*

Gardner-Denver Company, Quincy, Illinois.

In Canada:
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario.

WE CALL THEM "BULL DOGS" —you'll call them "WORKHORSES"



. . . these Tough Longer-Lasting V-Belts

TODAY with production at peak levels it pays to put your money on the right horse—a V-Belt that's a real "workhorse"! Dependable Bull Dog V-Belts have the built-in stamina that assures longer, no downtime operation that keeps production up and maintenance costs down.

And here are 4 reasons why Bull Dog V-Belts give you more for your belt money in trouble-free service, less slippage and savings through longer life:

1. Specially Engineered BWH Cord Section has high tensile strength. Result: superior load carrying capacity and ability to absorb shock loads.

2. Minimum Stretch — due to a new and exclusive technique in processing Bull Dog Cords. Result: less slippage, fewer adjustments, extended life of the belt.

3. Durable Covers — closely woven, heavy, bias-cut fabric takes the severe wearing action where the belt contacts the sheave and seals the belt against the penetration of dirt, grease, moisture.

4. Takes Punishing Flexing — BWH technologists with a 72-year background of leadership in mechanical rubber products have developed quality-controlled compounds which run cooler and do not crack or deteriorate under severe flexing.

If you're using Bull Dog V-Belts now—more power to you. If not, it will pay you to switch —ask your BWH distributor.

TOUGH PROBLEMS INVITED — Don't hesitate to ask us or your nearest BWH distributor about your power transmission belting, conveyor belting and hose problems. We're specialists in making mechanical rubber products work *better, longer.*

BWH
DEPENDABLE RUGGEDNESS

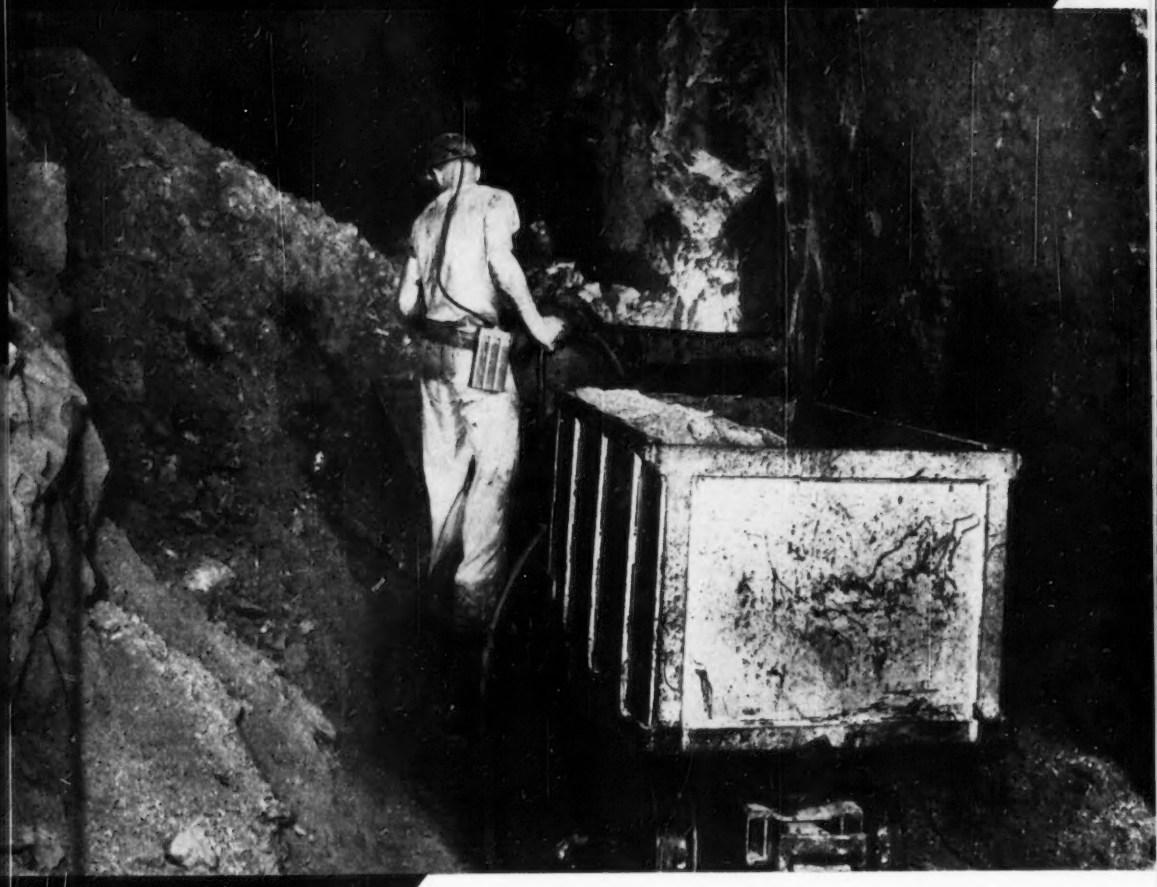
Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

Dependable Workers



Labor shortages make the choice of rock loading equipment even more important. Its easier to get men to work when they know they'll be operating Eimco RockerShovels.

Every operator is interested in Eimcos because they're easier and safer to operate, faster in loading and more powerful for crowding into the muck pile.

Eimcos make a more profitable operation all around. They're cheaper in maintenance costs and require less air to operate efficiently. They're the choice of discriminating buyers all over the world.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

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BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIFORNIA, P. O. BOX 240
KELLOGG, IDAHO, 315 MAPLE STREET

AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

A207

You can't beat an Eimco!

IT STAYS ON THE JOB

Thermoid Research Gives Greater Flexibility and Wear-ability to New-Type Hose!

Thermoid has designed *Thermine* Air Hose especially for more efficient and economical use in drilling operations—from construction jobs to mining.

Increased flexibility allows greater freedom of movement and permits bending the hose easily around tight corners. A heavy synthetic rubber oil-proof tube is reinforced with heavy braided rayon cord. Smooth, extra-heavy rubber cover offers maximum resistance to abrasion and cutting by sharp rocks.

Thermine Air Hose is mandrel-built from ¼" to 1½" inclusive in 50 ft. lengths. Available at your nearest Thermoid Distributor.

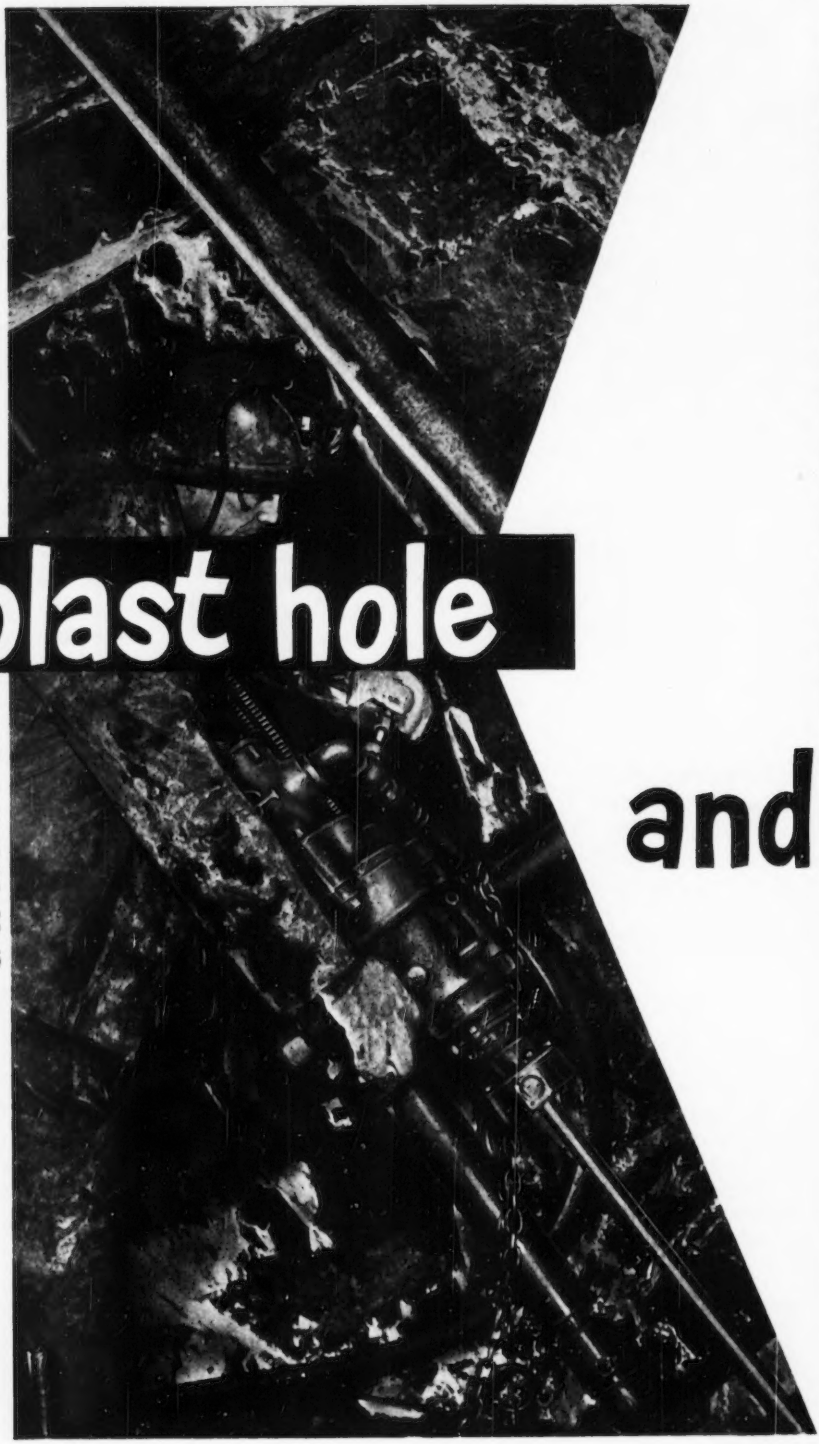
Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

For *Complete* Satisfaction *Specify* Thermoid!

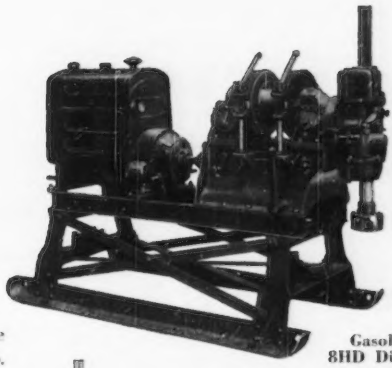
Thermoid Company

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U. S. A.
Industrial Rubber Products • Friction Materials • Oil Field Products

for blast hole and



CP-55 DIAMOND DRILL



Gasoline-driven CP No. 8HD Diamond Core Drill

Built for exploratory drilling from the surface, the gasoline-driven, skid-mounted CP No. 15HD and No. 8HD DIAMOND CORE DRILLS are readily moved from hole to hole under their own power.

Both are specifically designed for engineer's test borings, mineral prospecting and shallow oil structure drilling. Operating at the continuous high speed made possible by bortz bits, they give exceptional performance with remarkably low maintenance.

CP No. 15HD, with E-EX fittings, has a capacity of 2250 feet; CP No. 8HD, a capacity of 1250 feet. Both are also available with electric or Diesel drive, and with hydraulic head in place of screw feed.

Write for Bulletin 313

Gasoline-driven CP No. 15HD Diamond Core Drill

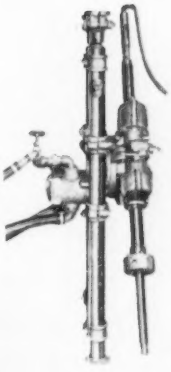
exploratory drilling

CP-55—FASTEST DRILL IN ITS CLASS

—designed around the improved CP Rotary Air Motor —the fastest, most powerful rotary motor on a diamond drill. For underground blast hole and exploratory drilling, the CP-55 DIAMOND DRILL is easy to handle; weighs only 160 pounds; requires a minimum amount of air per foot drilled.

Conservatively rated at 500 feet with E-EX fittings. Equally efficient for coring, non-coring or blast hole operations.

Write for Bulletin 318



Double-column mounted CP No. 12 Diamond Core Drill

Designed for underground use, the air-driven CP No. 12 DIAMOND CORE DRILL has a double-column mounting. Powered by a CP 25 h.p. rotary twin-air motor, it gives the same excellent performance as all other CP Diamond Drills. Its capacity, with E-EX fittings, is 1250 feet.

Motor, column and swivel head are readily dismantable for convenient underground transportation to "hard to get at" places.

Write for Bulletin 313

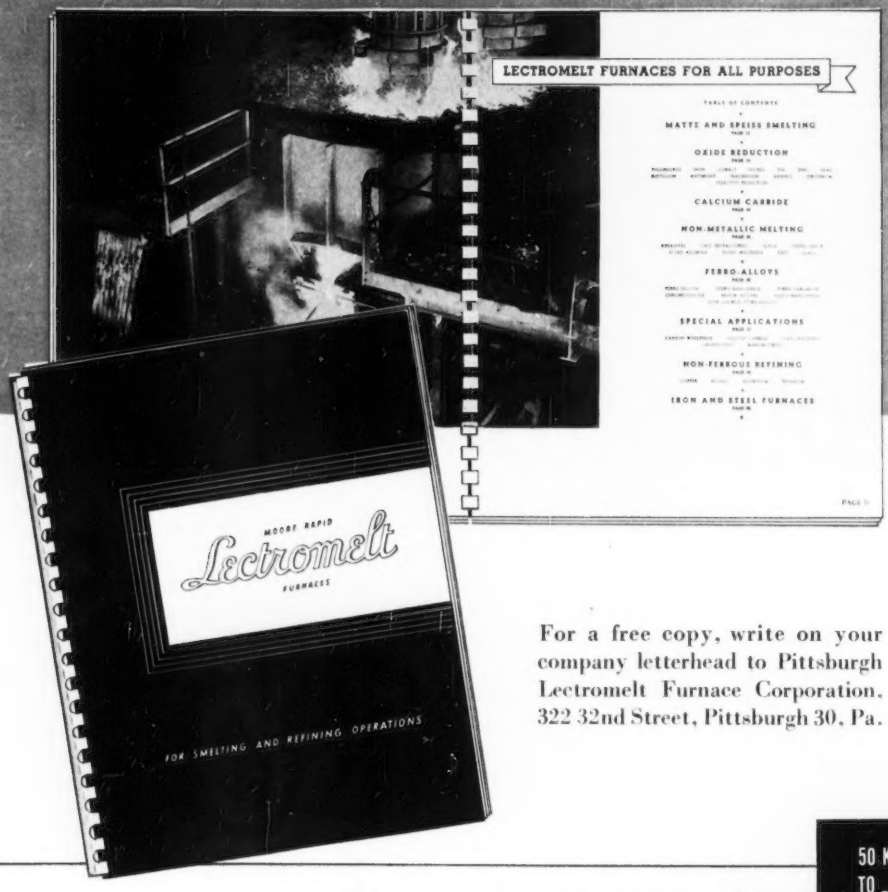
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

if you're interested in doing any of these things with an Electric Furnace,

you need this new book



For a free copy, write on your company letterhead to Pittsburgh Lectromelt Furnace Corporation, 322 32nd Street, Pittsburgh 30, Pa.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

Straight-Flow Port Design reduces fluid turbulence to a practical minimum.

Seat Rings of end-seated type are screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.

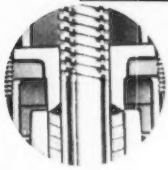
WALWORTH

iron body gate valves

with screwed or flanged ends

... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.



Brass Liner on Glands assures greater resistance to corrosion and scoring.

WALWORTH

valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

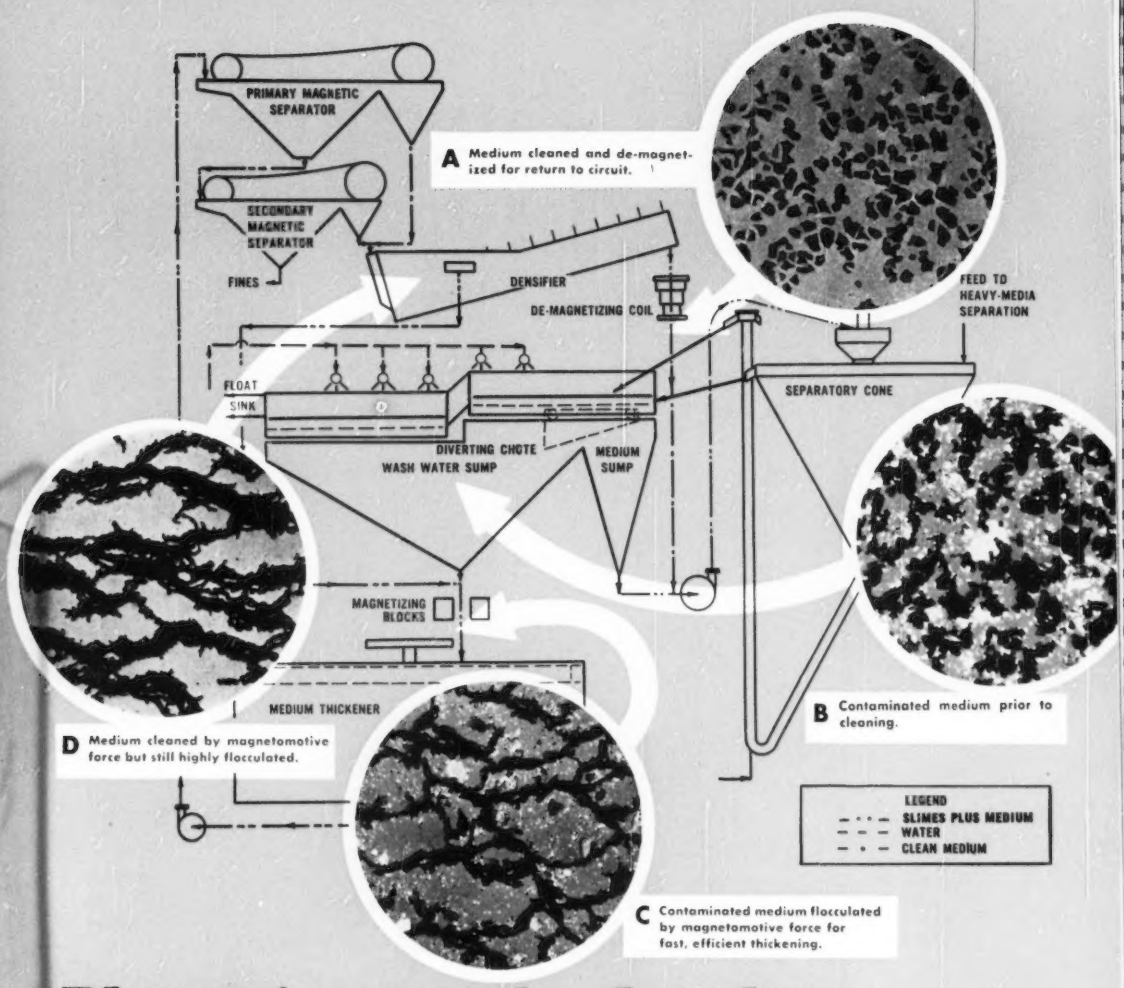
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

Bronze Back-Seat Bushings in bonnets of OS&Y valves.

Solid Web Type Disc in OS&Y valves for greater strength and longer service.

Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.



Photomicrographs show how

Heavy-Media Separation provides the most accurate separation by specific-gravity difference in the range 1.25 to 3.40

For years, mineral-dressing engineers have recognized heavy-liquid tests as the standard of comparison for mechanical or gravity separation processes in the beneficiation of metallic or non-metallic minerals. For years, they have known that a float-sink process using a mixture of finely ground, heavy solid and water offered the greatest promise of equalling on a commercial scale the perfect gravity separations obtained in heavy liquid laboratory tests.

Certain magnetic solids proved to have the ideal characteristics: High specific gravity, abrasion and corrosion resistance, ready availability and economic cost. With ferrosilicon and water or magnetite and water, accurate separations could be made over the wide gravity range of 1.25 to 3.40.

But despite these inherent advantages, the use of float-sink methods employing fine magnetic solids never achieved commercial success until the development of Heavy-Media Separation Processes. The signal success of Heavy-Media Separation is based on unique and exclusive applications of magnetomotive force to provide the necessary constant control, conditioning and recovery of the medium.

Photomicrographs of medium samples taken from a typical operating plant at the indicated points in the flow scheme show clearly how Heavy-Media Separation provides this precise and automatic medium control.

A shows the clean, dispersed and uniform medium that must be continually returned to the separating pool in order to maintain the desired specific gravity and to keep the viscosity low enough so that it will not interfere with sharp separation. By controlling the amount of medium sent through the cleaning circuit, the operator can maintain the specific gravity in the separating pool within ± 0.01 of the optimum separating gravity.

B shows dirty medium washed from the concentrate and gangue. Black areas are particles of ferrosilicon. White and grey spots are ore slimes that must be quickly and constantly removed so that they will not lower the gravity or raise the viscosity of the separating medium.

C shows the dirty medium after passing through magnetizing blocks. It is now well flocculated for fast settling in the medium thickener where the ferrosilicon quickly sinks while slimes and excess water overflow. Magnetomotive flocculation permits the use of relatively small, efficient thickeners with lower medium losses as well as lower plant costs.

D shows the medium after passing through the 99.9+% efficient magnetic separators. Non-magnetic foreign matter has been eliminated. The medium is now clean, but still in a flocculated, fibrous, magnetized state. To destroy the magnetic charge and allow the medium to disperse readily, it next passes through a demagnetizing coil. Now clean, dispersed and comparable in quality to its original condition (shown in A), the medium is ready to return to the separating pool.

No other float-sink method provides this exclusive 4-stage medium control with attendant low medium cost. No other method—float-sink or mechanical—provides the same uniform excellence of separating efficiency hour after hour, regardless of normal fluctuations in rate or character of feed.

More than 68 Heavy-Media Separation plants are now in operation for the beneficiation of 16 different minerals: Zinc, lead-zinc, iron, tin, manganese, lead, fluorspar and chromite ores, anthracite and bituminous coal, gravel, diamond-bearing ground, spodumene, andalusite, magnesite and garnet. As a pre-concentration method and to make a finished concentrate, Heavy-Media Separation has proved more accurate and economical than any other mechanical separation process on sizes down to 30 mesh. Indications are that feeds as fine as 65 mesh may be treated profitably in some instances.

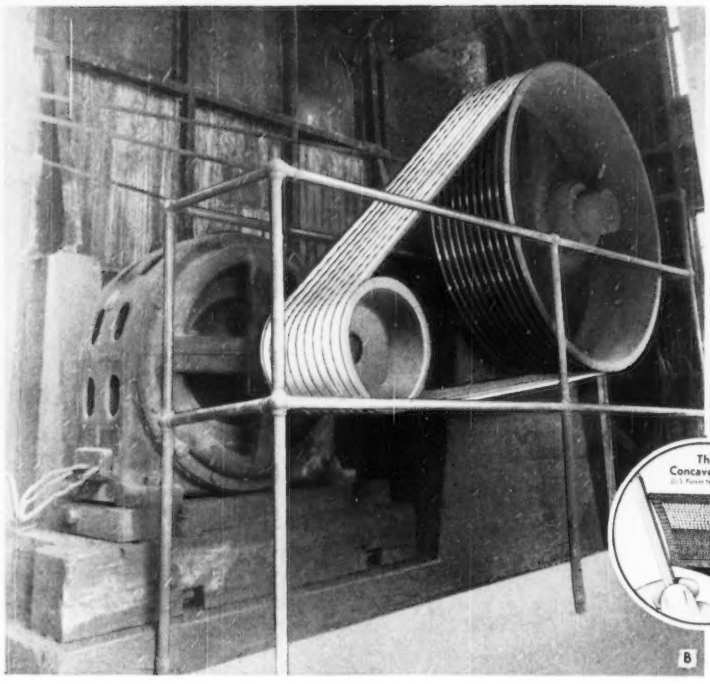
Before you decide upon any mechanical or gravity separation method, it will pay to make a comparative study of the higher recovery and better grade you can obtain by using Heavy-Media Separation. American Cyanamid Company, as Technical and Sales Representative for Heavy-Media Separation Processes, will work closely with you in the design and initial operation of Heavy-Media Units. We are prepared to run tests in the Heavy-Media Laboratory and to give you every practical help in fitting Heavy-Media Separation into your flow scheme.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

Printed in U.S.A.



In many smelters, poisonous fumes from the "sintering" of ore must be drawn through a precipitation machine by a large fan. Should this fan fail, the plant has to be shut down at once. The photo shows how a Utah smelter has safeguarded itself against this possibility by installing a multiple V-Belt Drive on this important fan. The original ropes on the drive are still good after operating 16 hours daily for 12 years.

Gates
REG U.S. PAT. OFF.
The Mark of SPECIALIZED Research

If you want LOWER V-BELT COSTS, just make this simple test!

Just pick up *any* V-Belt and bend it—exactly as it bends when going around its pulley—and *see what happens!*

The top of the belt is put under tension; hence it grows *narrower.* The body the belt is under compression and *bulges out.*

This change of shape, due to bending a *straight-sided* V-Belt, is shown in figures 1 and 1-A. Note how the bulging sides are forced to press *unevenly* against the V-pulley. This naturally causes uneven wear on the sides—*concentrated wear* where the bulge is greatest.

Now look at figures 2 and 2-A. There you see how the bending changes the shape of the V-Belt that is built with the Concave Side—the Gates Vulco Rope. The precisely engineered concave side of this belt merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove.*

Because there is *no bulging*, the sides of the Gates Vulco Rope always press *evenly* against the V-pulley and therefore wear *uniformly* —resulting in *longer belt life* and *lower belt costs for you.*

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear!—Longer Life!

CS-5011

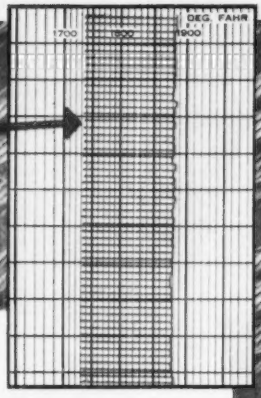
GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

ALL ROPES *look* ALIKE... but

IN *Wickwire Rope*

GRAIN SIZE OF STEEL IS ALWAYS UNIFORM



What has grain size of steel to do with longer rope life?

Plenty!

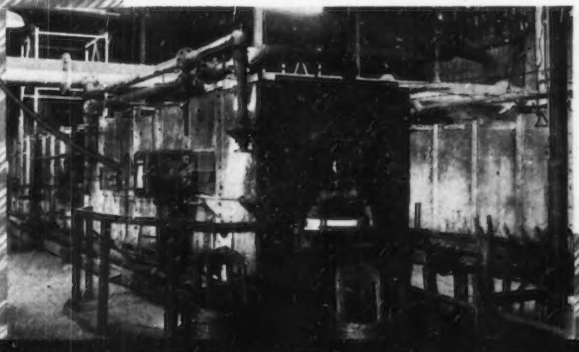
That's because in every commercial grade of wire rope, there's a certain critical grain size that gives highest resistance to bending fatigue. In Wickwire Rope we make sure that you get this definite grain size and that it is always uniform to exacting McQuaid-Ehn* standards.

Only a fully integrated company like Wickwire can give you this big advantage... because such control of grain size is possible only where all phases of manufacture are under constant check and test... starting with the melting and refining of the steel and continuing through heat-treating processes and cold drawing of the wire.

Here again—Wickwire goes "beyond specifications" to give you assurance of wire rope that can't be beat for reliability, safety and longer life.

***For detailed information on the McQuaid-Ehn test, write to our Sales Office, at Palmer, Mass.**

LOOK FOR THE YELLOW TRIANGLE ON THE REEL



Automatic heat control in our patenting or heat treating furnace operates within such close limits that the temperature in the furnace never varies more than a small fraction of one per cent.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N.Y.

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PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

THE GREAT NEW *Mid-Century* U.S. ROYAL FLEETMASTER

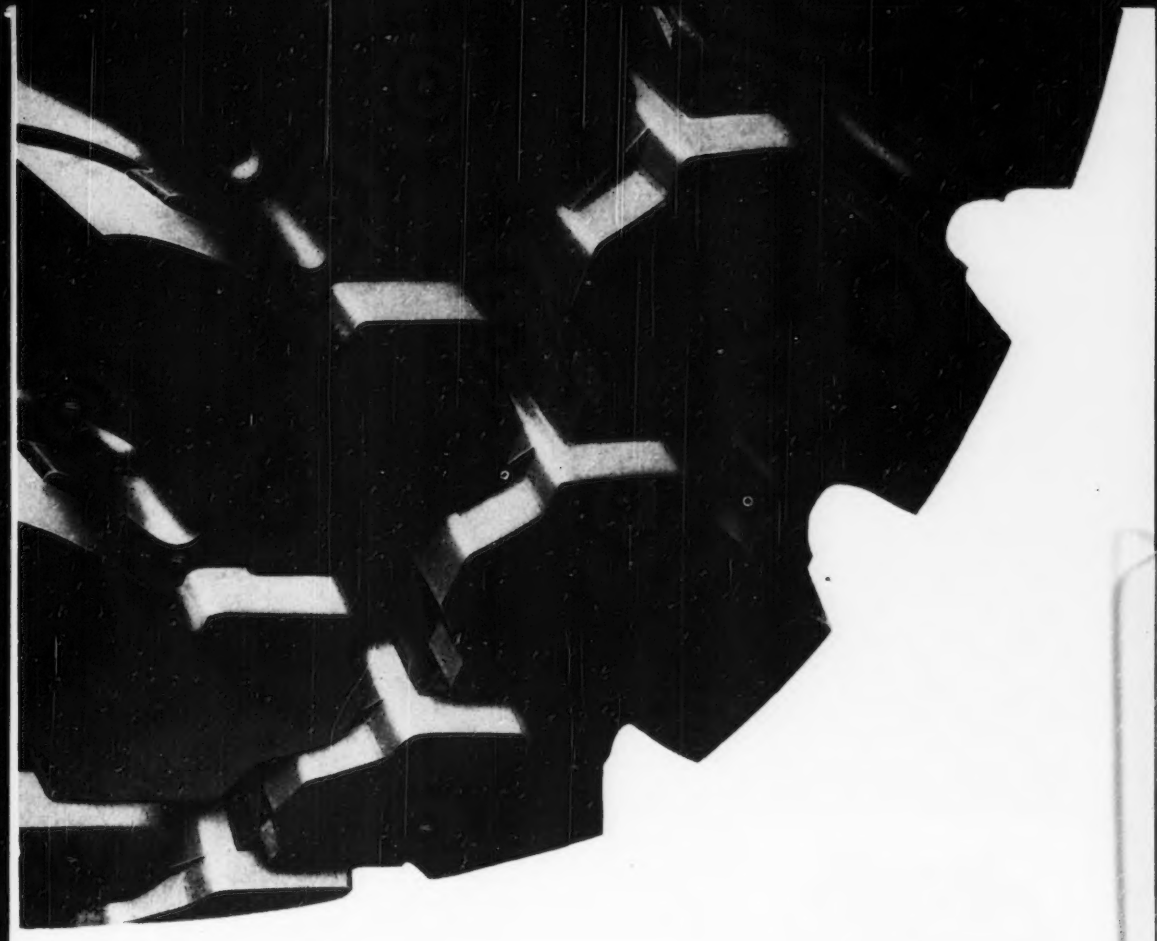
Off-the-Road Traction and Smooth

Truck Tires "Made-to-Order" for America's Specialized Mining Transport

Now comes the great New *Mid-Century* Fleetmaster to meet the trucking demands of mining men everywhere. Truckers who need the spearhead depth of its traction off the road—its smooth, free-rolling qualities on the highway.

This is a true revolution in truck tire design, with job-fitted tread built to eject rock or stone—sidewall compounds to exactly match the rolling requirements of your strip mining operation.

UNITED STATES



Highway Rolling *never possible before*

On-and-off-the-road performance never known before—

From Mine Pit to Hard-Surface Concrete

TODAY'S SUPREME TRUCK TIRE WITH HIGHWAY AND OFF-THE-ROAD TRACTION
never possible before!

★ *Job-fitted tread and sidewall compounds*
★ *Free-rolling tread surface*
★ *SPEARHEAD depth traction*
★ **NON-SKID** ★ **CHIP-RESISTANT**

A PHONE CALL DOES IT! This is another U. S. Rubber achievement—without rival, imitator or comparison. Phone your nearest U. S. Royal Dealer for Complete Performance Proof and your own JOB-FITTED SPECIFICATIONS.

RUBBER COMPANY *America's Largest Maker of Tires*

JEFFREY BELT CONVEYORS...

Roller or Ball Bearing Troughing and Return Idlers for Belt widths from 14" to 60" wide. Shown below is an Impact Absorption Idler. Used for protecting belts at loading points. Also Spool Type Return Idlers.

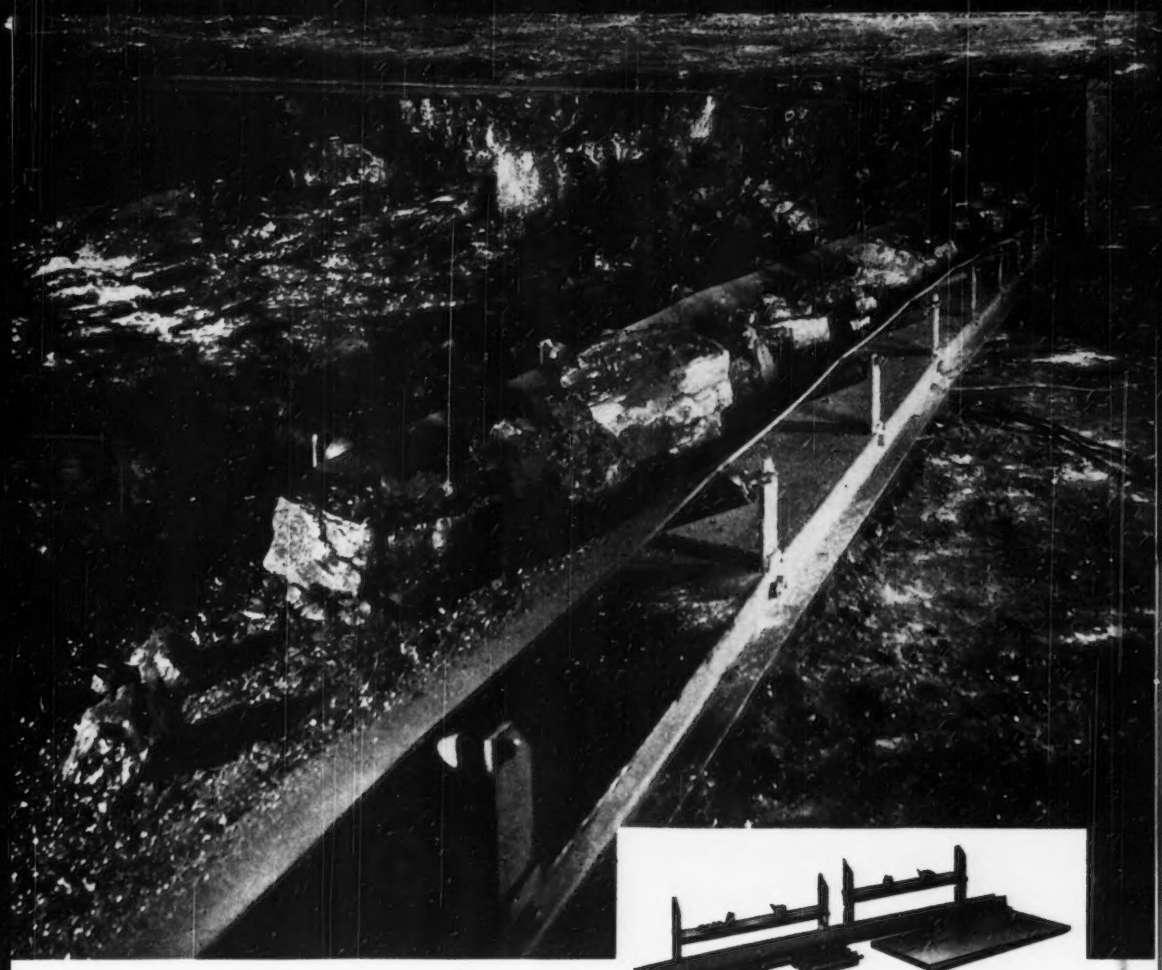
- Car Pullers
- Crushers
- Feeders
- Bucket Elevators
- Pulverizers
- Bin Valves
- Magnetic Separators
- Coolers & Dryers
- Constant Weigh Feeders
- Chains & Sprockets
- Transmission Machinery

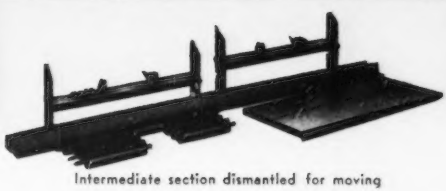
ABOVE GROUND

A great change in material handling methods in the construction field as well as other industrial enterprises has been wrought with big scale, and more often ingenious, applications of Belt Conveyors. Continuous and practically automatic, they "take it away" whatever the materials might be, at a rate that can be adjusted easily to the requirement.

Wherever time is the essence of profit . . . wherever positive, low-cost transportation is required, Jeffrey Belt Conveyors have enabled many a contractor to come through far ahead of schedule—to widen his opportunity for profit. When you see materials handled by methods other than conveyors—you might apply the yardstick: would conveyors do the job better, quicker, more economically?

We have opened the door to many new conveyor applications. A few proofs of Jeffrey preference include: Grand Coulee and Fort Peck Dams, East Boston Tunnel, Mesabi Iron Range, Alaska Gold Mining, Florida Ship Canal, etc. You can be assured of alert, experienced engineering . . . the ability to build carefully and to design for contingencies . . . prompt deliveries. Put them to work for you.





Intermediate section dismantled for moving

BELOW GROUND

Jeffrey Sectional type Belt Conveyors have been designed to provide an uninterrupted flow of coal or other material over long distances . . . some have been operated in lengths exceeding 3,000 feet. Furnished with single or tandem drive in belt widths from 26" to 42".

Conveyor can be easily extended by adding standard Intermediate sections . . . the "knock-down" construction of the sections permits them to be easily transported on the conveyor itself—when reversed. We will be glad to go into details.

- Drills
- Cutters
- Loaders
- Shuttle Cars
- Locomotives
- Chain Conveyors
- Fans & Blowers
- Jigs
- Continuous Mining Machines

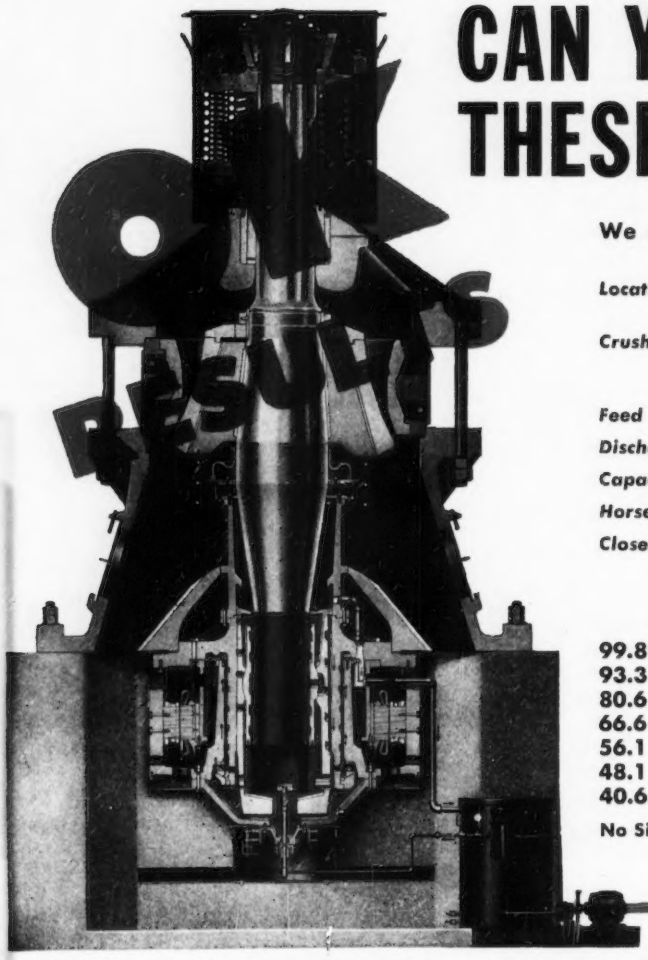
THE JEFFREY MANUFACTURING COMPANY

974 North Fourth Street, Columbus 16, Ohio

Baltimore 2	**Buffalo 2**	**Denver 2**	**Jacksonville 2**	**Pittsburgh 22**
Beckley, W. Va.	**Chicago 1**	**Detroit 13**	**Milwaukee 2**	**St. Louis 1**
Birmingham 3	**Cincinnati 2**	**Harlan, Ky.**	**New York 7**	**Salt Lake City 1**
Boston 16	**Cleveland 15**	**Houston 2**	**Philadelphia 3**	**Scranton 3**

JEFFREY MFG. CO. LTD., Montreal, Canada
JEFFREY-GALION (PTY.) LTD., Johannesburg, S. A.
THE OHIO MALLEABLE IRON CO., Columbus, Ohio

BRITISH JEFFREY-DIAMOND LTD., Wakefield, England
THE GALION IRON WORKS & MFG. CO., Galion, Ohio
THE KILBOURNE & JACOBS MFG. CO., Columbus, Ohio



CAN YOU BEAT THESE FIGURES?

We repeat them — for your greater crushing profits.

Location: **Nationally known Mining Co. in New York State**

Crushers: **Four No. 37½ Kennedy type "S" Roller Bearing Gyratory Crushers**

Feed Opening: **6¼"; Diameter of Head: 3 Ft.**

Discharge Setting: **7/32" Closed Side at Head**

Capacity Each Crusher: **56 Tons Per Hour**

Horsepower Each Crusher: **48 HP.**

Closed Circuit Operation:

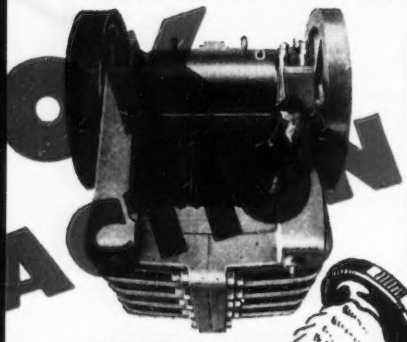
Gradation as Follows:

CHECK THE FIGURES!

99.8%	**Minus**	**3**	**Mesh**
93.3	"	**4**	"
80.6	"	**6**	"
66.6	"	**8**	"
56.1	"	**10**	"
48.1	"	**14**	"
40.6	"	**20**	"

No Sir — you CAN'T beat these "KVS" figures! They speak for themselves!

CAN A SWING JAW DO MORE?

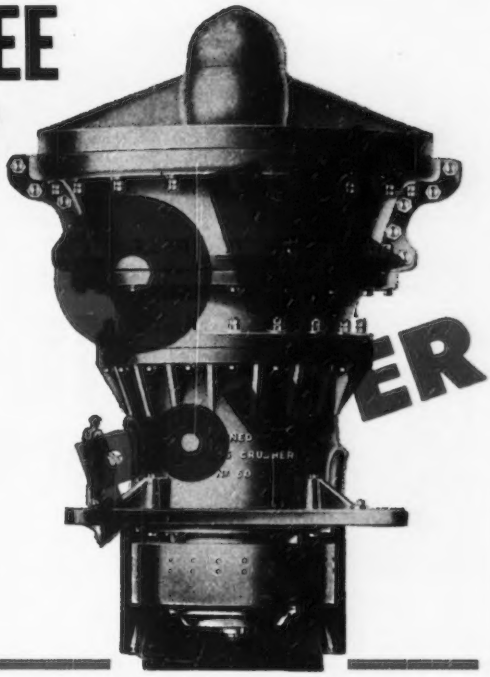


Yes—it COULD, we figured. It could crush MORE with less effort. So we checked POWER-LOSS in the 'KVS" Swing Jaw by making the STATIONARY jaw action carry HALF the load, instead of leaving 100% to the SWING jaw. Another thing we stopped is PARTS TROUBLE. The Swing Jaw is ALL ONE PIECE, except for renewable crushing plate. Note also — "KVS" Swing and Stationary jaws are INTERCHANGEABLE, also reversible end for end. That also MULTIPLIES jaw-crushing life!

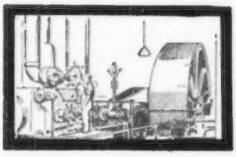
ALL ONE PIECE EXCEPT JAW PLATES

THEY'RE OK BECAUSE TROUBLES ARE

CAN YOU USE FREE ADDED POWER?

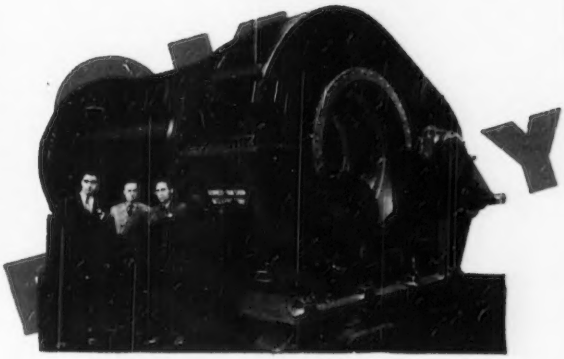


The old Corliss Engine had a big whirling flywheel or pulley that developed KINETIC ENERGY (or, in simple words, added FREE power). The "KVS" Gearless has a big whirling pulley, too! It whirls at 3,500 ft. per minute — it creates the free EXTRA crushing power you get! What's more, the 11-ton pulley (used in a "KVS" Gearless Crusher weighing 400,000 lbs.) turns so easy you can move it with TWO FINGERS! In short, more CRUSHING for LESS POWER COST (with far less vibration and far less NOISE), are ideas that crusher-users have OK'd—that's why they say "OK" to the "KVS" Gearless.



CAN YOU STAND SAVING $5000.?

Who can't? How'd you like to save about that on a 10 ft. tube or ball mill? Well, you CAN save it — if you pick a "KVS" Mill with integral gear drive. Because, with this drive, you use a SYNCHRONOUS MOTOR, at a TREMENDOUS saving! You see, the motor is DIRECT CONNECTED to driving shaft, carried in roller bearings that CANNOT be misaligned or set wrong. Pinion shaft to which the motor is connected runs at about 600 r.p.m. while pinion shafts in other mills run at about 180 r.p.m. "KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically sprayed with oil before tube mill is started (design patented). In 15 years no "KVS" gears or pinions have worn out on this type mill. OK? We think so!



There are "KVS" BULLETINS covering all the above. Write for them today.

OK *- write to...*

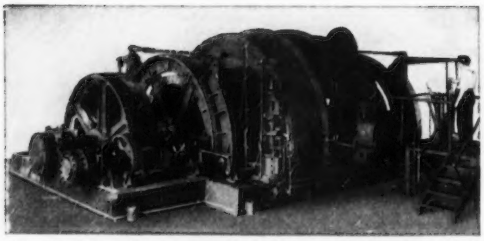
Kennedy-Van Saun

MANUFACTURING AND ENGINEERING CORPORATION

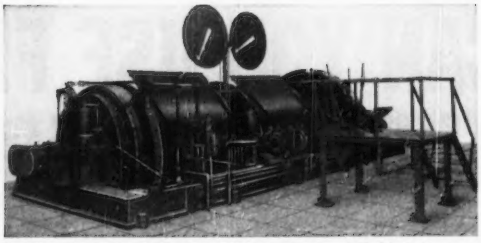
2 PARK AVE., NEW YORK 16, N. Y.

FACTORIES:
DANVILLE, PA., U.S.A.
CANADA, ENGLAND, FRANCE, AUSTRALIA

LEFT OUT—*YES SIR!*



1750 hp. Electric Hoist for coal-mining company. Cylindro-conical tight-and-loose drums are each 9 to 13 ft. in diameter; grooved for 1676 ft. of active 1⅝" rope. Equipped with air-operated brake and clutch engines and modern safety devices that provide dependable protection against any damage that might be caused by current failure, overwinding or overspeeding.



600 hp. Electric Hoist for metal-mining company. Cylindrical drums are each 7 ft. in diameter; grooved for 2650 ft. of active 1¼" rope. In addition to post-type brakes, oil-hydraulic brake and clutch engines and modern safety devices, this hoist is equipped with a system of dynamic braking that assures important savings in both operating and maintenance expense.

MINING EQUIPMENT

with a 101-Year Record of Satisfactory Service

Vulcan "Allcasteel" Sheave on modern headframe. Besides being light and very strong, Vulcan Allcasteel sheaves are so highly resistant to rope wear that NO LINERS ARE NEEDED. Available in a wide range of types and sizes with either plain or anti-friction bearings.

Standard 5 hp. Car-Spotting Hoist. Triple-reduction alloy-steel gears and other superior mechanical features assure long service life and low maintenance expense. We build room hoists, scraper hoists and other self-contained electric hoists in a wide variety of types and sizes to meet any probable requirement.

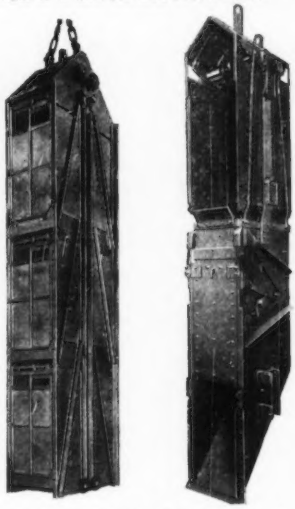
6-Ton Low-Height Diesel-Mechanical Locomotive for underground operation in a foreign country. Special equipment includes back-fire arrester and wet-type exhaust muffler. We also build Electric Mine Locomotives and all types of Diesel, Steam and Fireless Locomotives.

Located in the heart of the anthracite field, the Vulcan Iron Works has been building dependable mining equipment since 1849, taking full advantage at all times of every approved advance in design, materials and manufacturing methods. Unsurpassed facilities and a long-established policy of sturdy construction assure prompt deliveries and satisfactory service at lowest ultimate expense.

So many problems have been solved successfully during this long period of service to mining companies throughout the United States and many other countries that most requirements can now be taken care of successfully by utilizing some well-proved design with little or no modification. Our experienced engineers are always ready, however, to cooperate with the purchaser in the development of a new design to meet his particular operating conditions.

Write us regarding any requirement within the wide range of equipment listed below. We welcome opportunities to make helpful suggestions without charge or obligation. Bulletins on request.

Self-Dumping Cage for high-speed hoisting in a coal mine. We build many other types of cages for coal and metal mines; either from our own designs or to meet purchaser's specifications.



At left: Three-Deck Man Cage for metal mine. Small wheels with pneumatic tires are used, instead of guide shoes, to reduce the vibration and shocks of high-speed hoisting.
At right: Combination Man-Cage and Bottom-Discharge Skip for metal mine. Alloy-steel linings and rubber interlinings assure high resistance to corrosion, abrasion and loading shocks.

Vulcan Iron Works, Wilkes-Barre, Pa.

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists
Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Toothed Double-Roll Crushers
Steam Locomotives
Diesel Locomotives geared and electric drive
Gasoline Locomotives geared and electric drive
Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Briquetting Machines
Heavy Special Machinery
Open-Hearth Steel Castings

Put safety and reliability into your boom supports

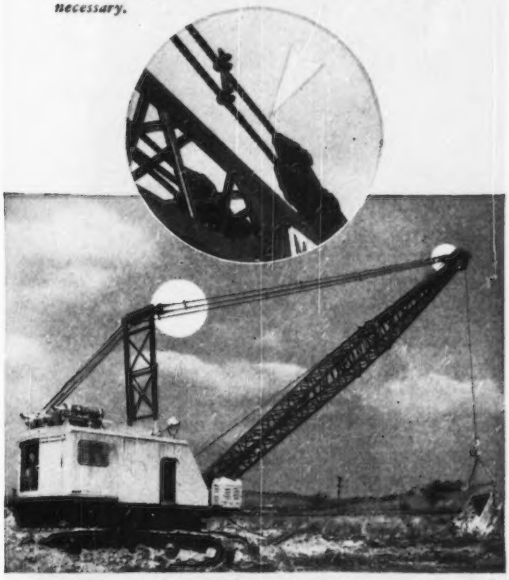
with new Fatigue-Resistant

TIGER BRAND WIRE ROPE ASSEMBLIES

An exclusive development of American Steel and Wire Company

HERE'S THE TROUBLE SPOT

On old style boom supports, vibration was concentrated at the point where the wire rope entered the socket. For machines where vibration was *not* severe, this assembly was satisfactory. But for today's high-power, high-speed machines, *a boom support with much greater resistance to fatigue is absolutely necessary.*



HOW THE TROUBLE WAS ELIMINATED

The New Fatigue-Resistant Tiger Brand Wire Rope Assemblies are an *innovation.* They effectively combat the most severe vibration on power shovels, draglines and cranes. Note carefully the novel end thimble interwoven into the pendant. Vibration is dampened over a long section instead of being concentrated at one point.

2 TO 3 TIMES LONGER LIFE

The new construction has been proved in actual operation to last two to three times longer than the old assemblies — and in some cases even better results were obtained.

INTERCHANGEABLE ON STANDARD EQUIPMENT

You can replace your old boom supports with these new assemblies quickly and easily because essential dimensions such as pin diameters, distance between ears, etc. are the same as for standard open and closed sockets. Send the coupon for complete information.

American Steel & Wire Company
Rockefeller Building, Dept. C-110
Cleveland 13, Ohio
Please send me complete information on your new Tiger Brand Boom Support Assemblies.

Name.....

Title.....

Company.....

Address.....

City.....State.....

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL

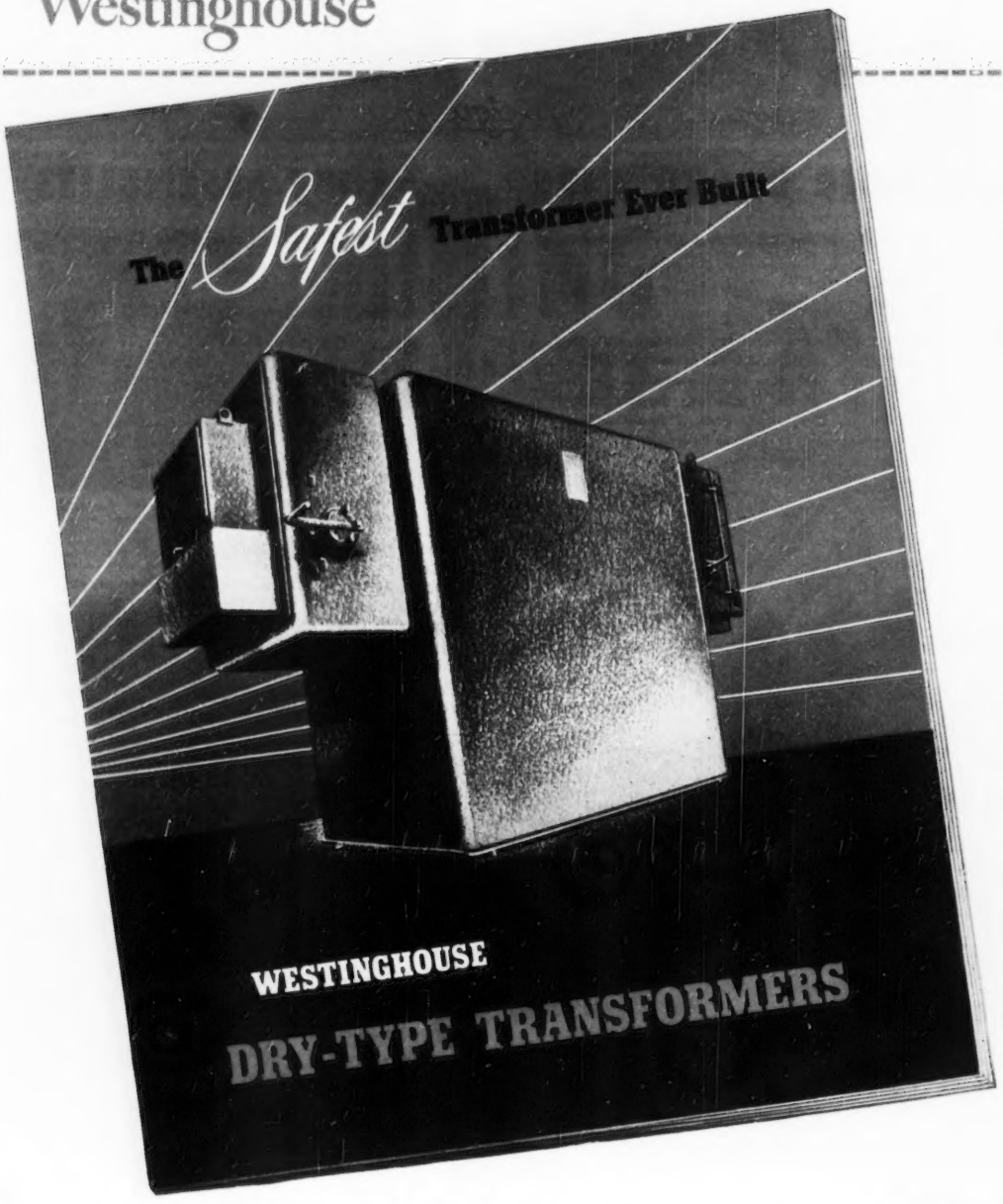
USS TRADE MARK

AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

YOU CAN BE SURE.. IF IT'S
Westinghouse



New Booklet!

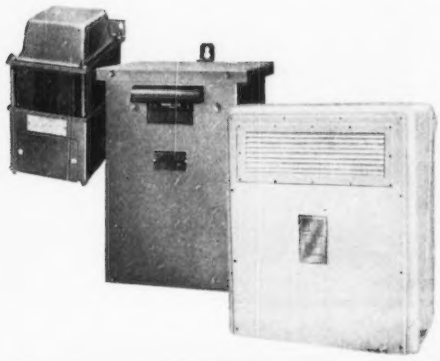
Tells where and how Dry-Type Transformers can provide greater safety . . . save money . . . do a better job for you

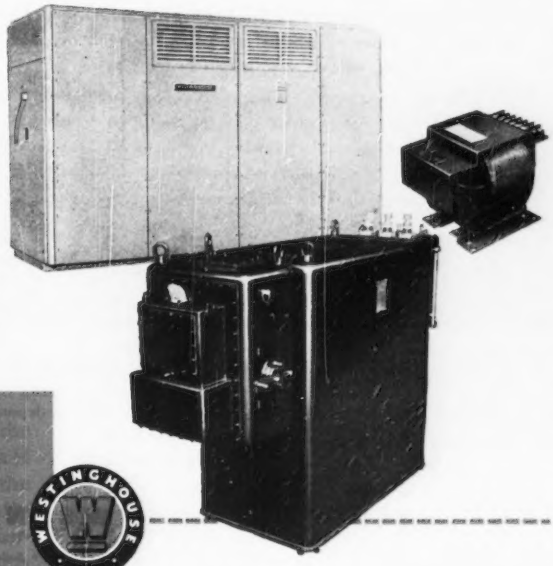
It's just off the press. "The Safest Transformer Ever Built" is a fully illustrated booklet on Westinghouse Dry-Type Transformers.

The booklet's 24 pages show the many typical applications of the Dry-Type Transformer and the various sizes, ratings and types available to fill your requirements. Examples clearly illustrate the savings possible on installation, maintenance and power costs.

This new booklet is *free* to you. Get your copy now from your Westinghouse representative or write for booklet B-4428, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

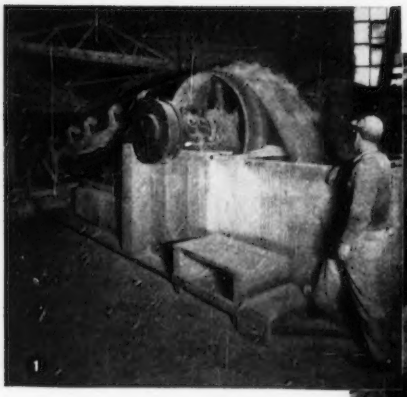
J-70574

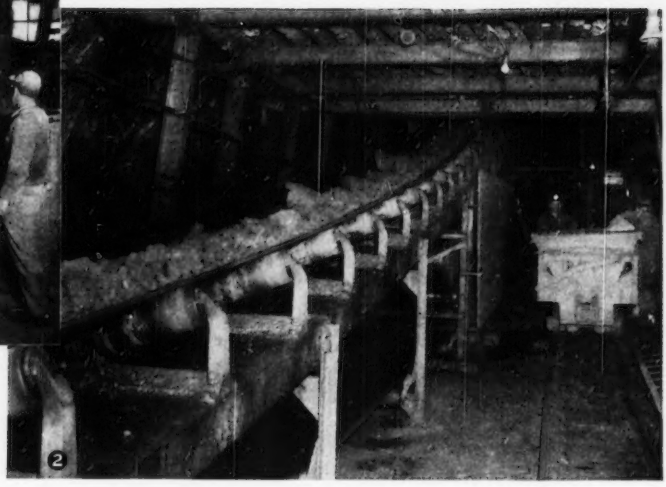




Westinghouse

DRY-TYPE TRANSFORMERS





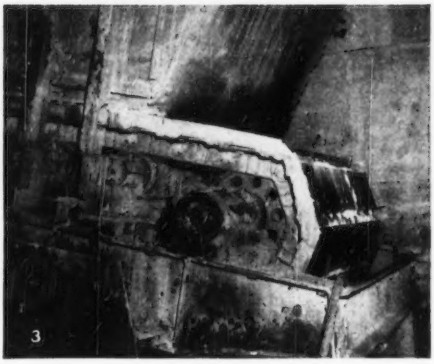
Moving Bulk Materials

Costs LPT with S-A Equipment!

LESS PER TON COST are the words that mean economical bulk handling operations for all phases of mining . . . conveying, elevating, storing, feeding and reclaiming, even under the most difficult conditions.

S-A engineers—for nearly half a century—have been developing "tailor-made" handling systems for moving bulk materials with the greatest possible economy under or above ground—in heat or cold, rain or shine, wet or dry, humid or dusty.

When you consider any changes or additions to your present conveying system, ask S-A engineers for suggestions . . . they have the experience, facilities and a complete line of equipment to work with in helping you to find the low cost solution. Write today!



1 This conveyor at a copper mine has handled more than 26 million tons of ore. Illustration shows head end of 48" wide x 1135-foot long belt that conveys primary crushed ore to 2500-ton storage bin at secondary crushing plant. S-A roller type holdbacks prevent belt reversal. Gravity-type take-ups keep belt at proper tension.

2 At an iron mine, ore is handled underground on this 36" wide belt conveyor, 818 feet long, conveyor operates at 200 feet per minute and handles 250 tons per hour. Ore is brought out from side drifts on shaker conveyors feeding the belt conveyor which, in turn, deposits ore in storage pockets.

3 Rugged, heavy-duty Amsco manganese steel pan feeder is mounted under a truck dump hopper and feeds ore which has been hauled by truck from mine to a crusher. Extra wide pans prevent arching, or blocking, of ore in the throat of the bin. Amsco feeders give continuous, trouble-free service under severe operating conditions.

STEPHEN S-A ADAMSON MFG. CO.

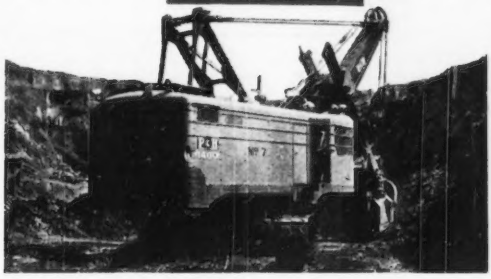
4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif. • Belleville, Ontario

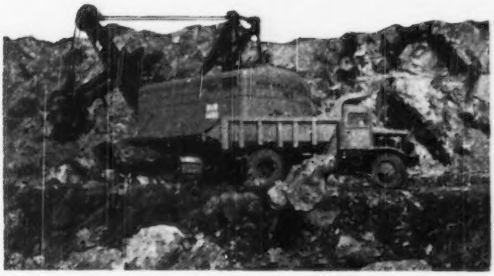
DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

PRODUCTION IS UP!

COSTS ARE DOWN!

WITH P&H ELECTRIC SHOVELS . . .





. . . at the Steep Rock Iron Mines in Canada. Here, the first P&H Model 1400 (4 cu. yds.) was quickly followed by two more.

Bigger tonnage at lower cost . . . that's the real test. And there's where you'll find the P&H 1400 leads the way with such features as the Magnetorque* which electro-magnetically powers the hoisting motions . . . *smoother, faster,* and more *dependably.* Quicker move-ups by independent propel add *more* tonnage. Stepless electrical control saves time by eliminating *all* contactor troubles. These and many other P&H features combine to give you increased production. Greater production means greater profits for you. Write, today, for information.

*Trade-mark of Harnischfeger Corporation for electro-magnetic type clutch.

Every third P&H electric shovel sold is a repeat order.

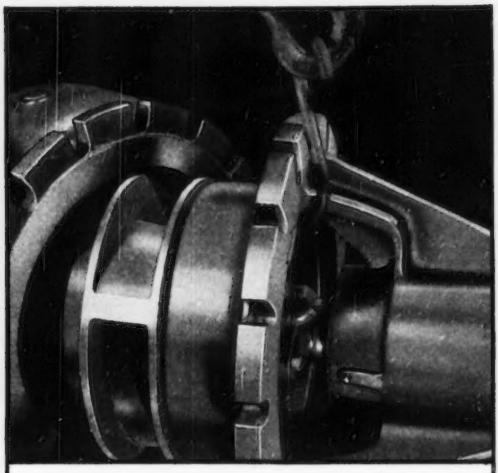
P&H ELECTRIC SHOVELS
4454 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

Remove Rotating Element in 5 Minutes!

ALLIS-CHALMERS SOLIDS HANDLING PUMP

1. Remove Casing Bolts lift and disconnect drive. Just loosen bolts and bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.



2. Swing Out Rotating Element. Neither suction nor discharge piping need be disturbed. All wearing parts are fully accessible for inspection or servicing.

THE PUMP IS BACK IN SERVICE IN LESS THAN A HALF HOUR

QUICK, EASY SERVICE AND LONG RUNS between servicings are the two things operators want most in solids handling pumps. You can see for yourself how quick and easy service is with an Allis-Chalmers Solids Handling pump.

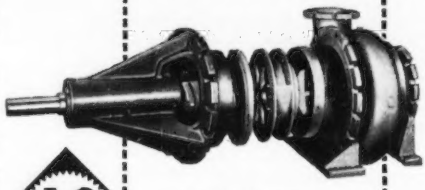
You get long life, too, because Allis-Chalmers Solids Handling Pumps are made of special hard *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know solids handling problems and how to solve them.

Get complete information on Allis-Chalmers Solids Handling pumps from your nearest Allis-Chalmers Sales Office. Or write for Bulletin 08B6381.

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

A-3216

Allisite is an Allis-Chalmers trademark.



ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

ALLIS-CHALMERS

an AKINS machine

TO FIT ANY CAPACITY REQUIREMENT

Large or Small

For

Closed Circuit Grinding

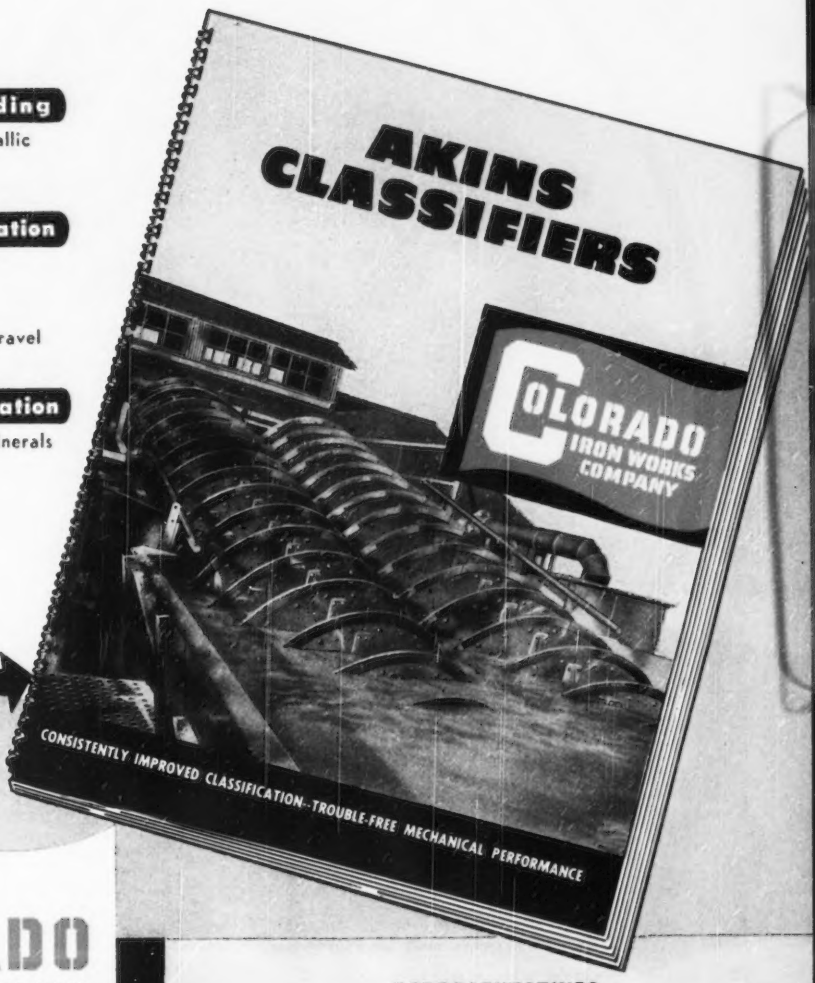
- Metallic and Non-Metallic Ores
- Cement

Washing and Concentration

- Ores
- Phosphate Rock
- Glass Sand
- Industrial Sand and Gravel
- Oyster Shell

Heavy Media Concentration

- Ores and Industrial Minerals
- Coal



JUST OFF THE PRESS
Write for Bulletin No. 48—
NO OBLIGATION

COLORADO
IRON WORKS
COMPANY

DENVER 2, COLORADO

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John Carruthers & Co., (Pty.) Ltd., Sydney, Australia;
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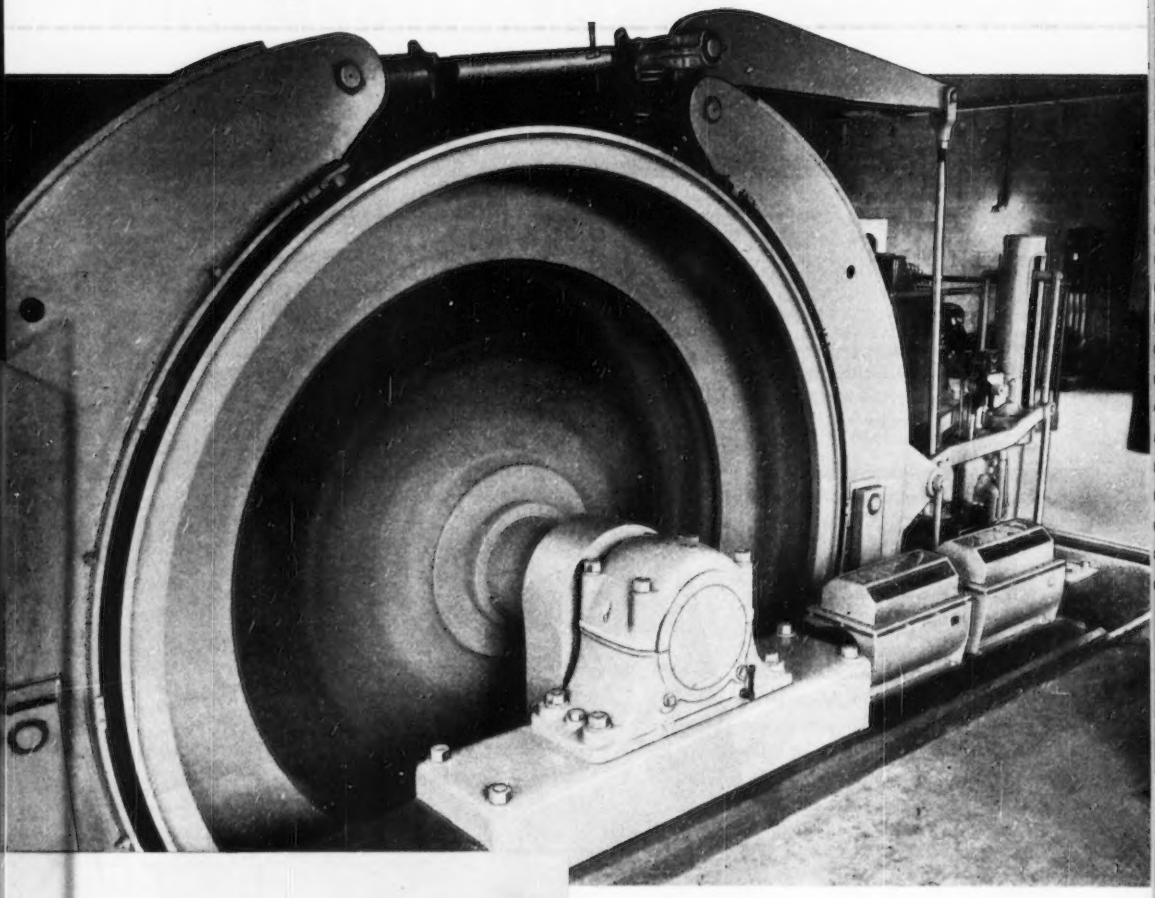
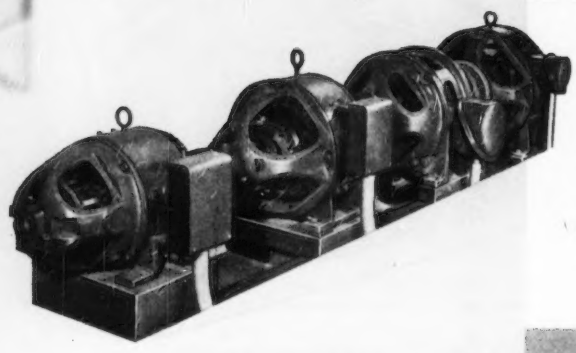
YOU CAN BE **SURE**.. IF IT'S

Westinghouse





"Operatorless operation" is provided by this new Westinghouse-equipped Automatic Hoist installed in the Green Valley and Wabash Mine of the Snow Hill Coal Corporation. After the hoist is placed in operation at the start of a shift, the automatic control provides continuous hoisting. It moves coal from the hopper onto the weighing pan, fills the skip, travels it upward, dumps it and returns it for another load. The cycle is repeated indefinitely until stopped, or until there is no coal left in the hopper.

These Rototrol rotating regulators provide the "judgment" for automatic control. They assure uniform time cycles of preset duration, smooth stopping and accurate positioning of the skip at the loading pocket and on the dumping horns.

WESTINGHOUSE

Westinghouse

EQUIPMENT FOR THE MINING INDUSTRY

NOW... AUTOMATIC HOIST OPERATION

FOR MORE TONS PER MAN-HOUR

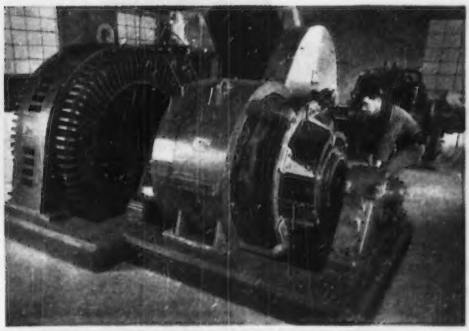
The installation shown at the left is the Westinghouse-equipped Automatic Hoist in the new mine of the Snow Hill Coal Corporation in Indiana. The operation is continuous and completely automatic.

Using the Rototrol rotating regulator as a robot control, the hoist moves up to 700 tons an hour at any preselected working level. The operator simply sets the hoist at the beginning of the shift.

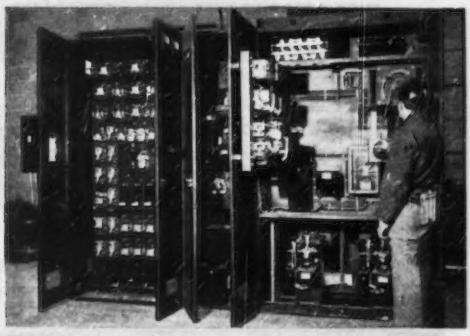
This Automatic Hoist is the latest addition to the complete line of Westinghouse drives for coal, metal and nonmetallic mine hoists. It is one more example of how Westinghouse co-ordinated engineering meets the need of the mining industry *for more tons per man-hour.*

If you have an underground hoisting problem, Westinghouse Mining Industry Specialists will gladly help you select and apply the right electric drives. Call your nearest Westinghouse representative, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94808



This 1000-kw, 720-rpm synchronous motor-generator set supplies power for the automatic hoist. In the background may be seen the 1250-hp, 450-rpm, d-c motor and the cylindro-conical cable drum with maximum rope speed of 2485 fpm.



The control center unit provides two types of control. (Left) The relay board, containing relays, circuit breakers and contactors, gives automatic operation. (Right) When desired, the operator can operate hoist manually for inspection.

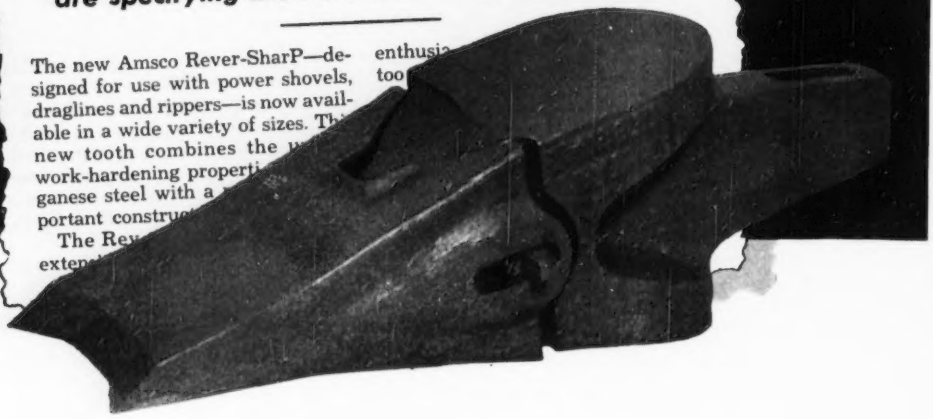
Completely New Tooth Has 6 Major Features

More and more operators of excavating equipment are specifying the new AMSCO® Rever-SharP

The new Amsco Rever-SharP—designed for use with power shovels, draglines and rippers—is now available in a wide variety of sizes. Th... new tooth combines the ... work-hardening properti... ganese steel with a ... portant construct...

The Rev... exten...

enthusia... too...



1. Manganese Steel Construction throughout—The Rever-SharP actually thrives on hard use . . . *the harder you use it, the harder it gets!*

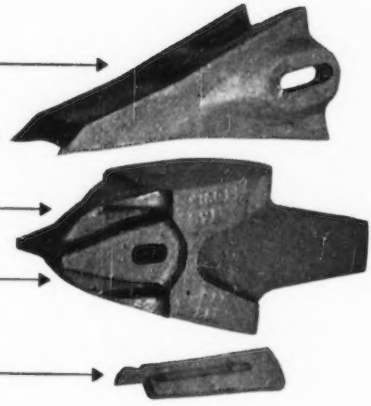
2. Reversible Tip—when the cutting edges of the Rever-SharP are finally worn, simply turn the tip over. *It's self-sharpening.*

3. Reinforced Cutting Edges—specially designed extended corners are the first to work-harden, thus equalizing wear along the entire length of the cutting edge.

4. Heavy, Rugged Adaptor—extra metal protects base connections and lips. Now available for all base connections.

5. Reinforced Adaptor Nose—supported by ribs along entire length, making bending or breakage practically impossible. Special taper makes lips self-tightening during use.

6. Tapered Lock-Key—easy to insert and remove. Has rubber insert—can't work loose in service.



Enthusiastic users of the new Rever-SharP report higher digging efficiency—and as much as 6 times longer tooth life. *It's a new development worth investigating—write today for the complete facts!*

AMERICAN Brake Shoe COMPANY

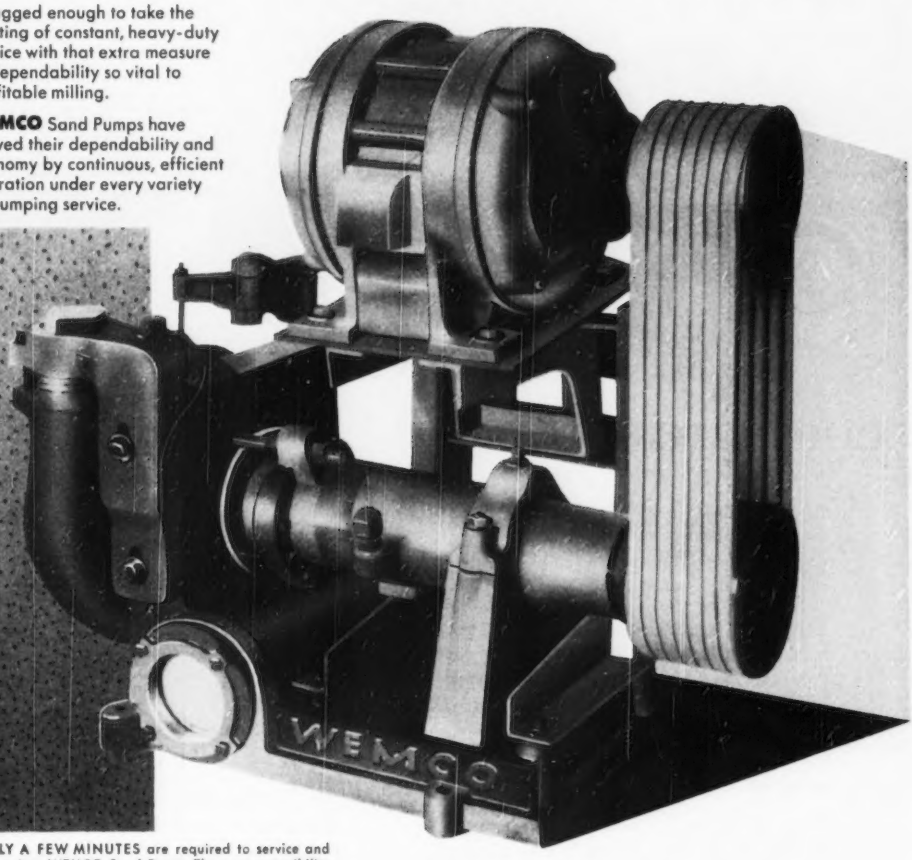
AMERICAN MANGANESE STEEL DIVISION
376 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

RUGGED is the word for **WEMCO** SAND PUMPS

—rugged enough to take the beating of constant, heavy-duty service with that extra measure of dependability so vital to profitable milling.

WEMCO Sand Pumps have proved their dependability and economy by continuous, efficient operation under every variety of pumping service.



ONLY A FEW MINUTES are required to service and maintain a WEMCO Sand Pump. The easy accessibility to wearing parts provided by the WEMCO design is an important factor in keeping service interruptions and maintenance labor costs to a minimum. Clearance adjustments are quickly and easily made so that high pumping efficiency is constantly maintained.

IMMEDIATE DELIVERY OF WEMCO Sand Pumps and replacement parts is assured from various WEMCO warehouse stocks.

WEMCO
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET SAN FRANCISCO 7, CALIFORNIA

WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioners and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

PRINCIPAL OFFICES
San Francisco • Sacramento • Salt Lake City • Spokane
Pocatello, Idaho • Denver • Phoenix • Tucson • Chicago
Hibbing, Minnesota • Bartow, Florida • New York

EXPORT DISTRIBUTORS
The Ore and Chemical Co.
80 Broad Street • New York 4, N.Y.

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Dr. Ing. Herbert Lickfett, A. B, Stockholm 3, Sweden
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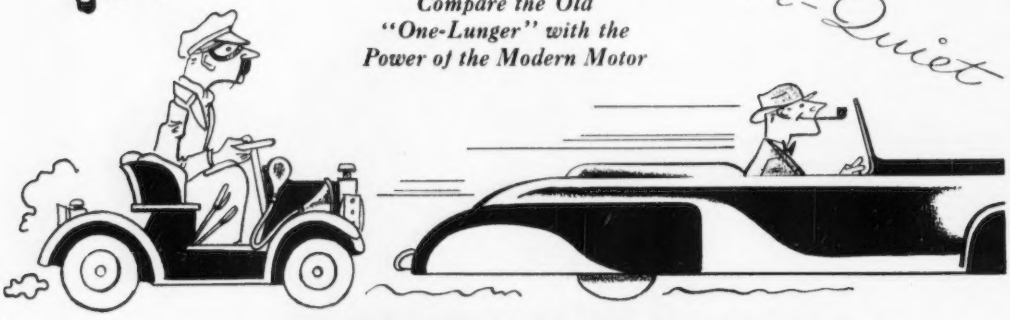
Ferdinand Egeberg & Company, Oslo, Norway
Midec, Milan, Italy
A. Schubarth & Company, Basle, Switzerland
G. Maltisiniatis & Co., Athens, Greece
Agence Miniere & Maritime, S. A., Antwerp, Belgium
Adil Gabay & Albert Koenka, Istanbul, Turkey
Philippine Industrial Equipment Co., Manila, Philippines
Fraser & Chalmers (S. A.) Ltd., Johannesburg, South Africa

Yesterday--
JERK ! BANG!

Today--
Smooth-Quiet

Compare the Old "One-Lunger" with the Power of the Modern Motor



...so ROCKMASTER "16" compares with old blasting methods

In the ROCKMASTER "16" Blasting System, pioneered by Atlas, sixteen milli-second delay electric detonators, all starting together, fire at controlled split-second intervals over a period of only a little over a half-second.

Talk to any experienced blaster who has compared ROCKMASTER split-second blasting methods with ordinary instantaneous or delay-action blasting. He'll tell you why it's like comparing a modern multi-cylinder automobile with an old-time one- or two-cylinder model! ROCKMASTER blasting gives a smooth flow of blasting power that means control over throw and breakage never before possible—*with far less noise and vibration!*

Your job may call for two, three, or even all sixteen ROCKMASTER detonators. We help you select them to fit a particular job in quarry, strip pit, mine, construction . . . on the surface or underground. Drill pattern is adjusted to fit the system, often with substantial savings in drilling and dynamite.

Write for your copy of booklet on the ROCKMASTER "16" Blasting System. It includes diagrams for typical loading in quarries, strip pits, mines and many types of construction.

Less Bark *More Bite*

ROCKMASTER "16" TIMINGS

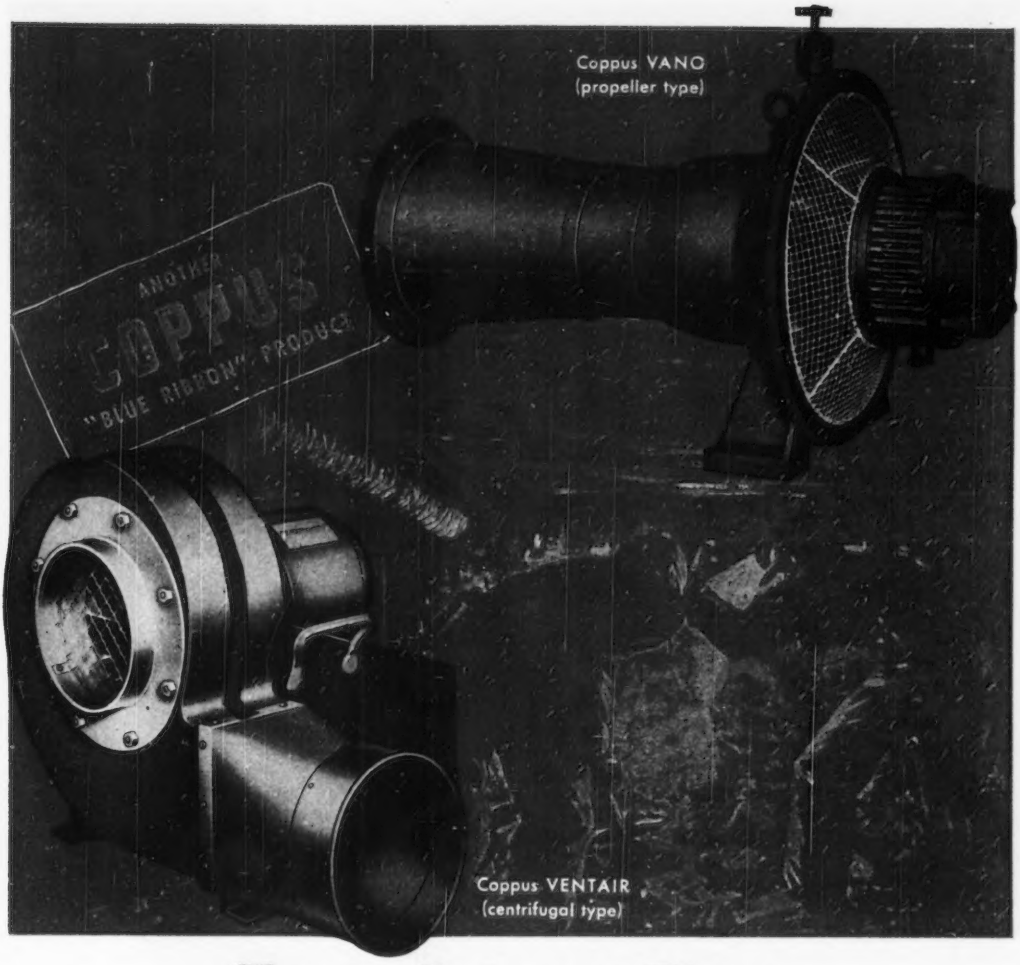
Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address*—**Atpowco**



Choose Between Them and Get 30% to 100% More Air

Coppus Blowers are designed for two different types of mine ventilation requirements: the centrifugal Coppus VENTAIR is for long pipe lines; the propeller-type Coppus VANO for shorter lines . . . the correct selection will give you from ⅓ more to twice as much air — for a given power consumption — than an ordinary all-purpose fan.

Available for either compressed air or electric motor drive, both can be used as blowers or exhausters and are obtainable in capacities up to 90,000 CFM.

Only Coppus makes both these types, one of which will give you better, more economical mine ventilation . . . know them by the "Blue Ribbon" that symbolizes the engineering and production skill behind every Coppus product.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Massachusetts.

COPPUS ENGINEERING CORPORATION
291 Park Avenue, Worcester 2, Mass.

Please send.....Bulletin 130

Name .....

Company .....

Address .....

WHY MINE OPERATORS GET

J&L STEEL

30% to 60% Longer Service

Mine operators get 30% to 60% and even *longer* service from wire ropes of this unique design because *it has more steel and fewer voids than any conventional wire rope!* Result: Higher strength . . . Greater flexibility . . . Easier handling . . . Longer life.

Published records prove that this wire rope, when used in applications for which it was designed, reduces operating costs, diminishes downtime and increases profits.

Known as CENTERFIT, an exclusive J&L wire rope, it is laid together in *one* operation. All strands run in the *same* direction. Outside strands fit snugly into valleys between inside strands, eliminating crossing as in conventional designs. *This prevents internal nicking.*

CENTERFIT is recommended for *hoist lines, closing lines, cable controls* on earth moving equipment, and *draglines* when operating on small diameter drums and sheaves.

In addition *only* J&L wire rope is lubricated with BRONZ-LUBE—the lubricant with the high film strength that prevents squeezing out between strands. BRONZ-LUBE contains fine flakes of soft bearing metal providing a smooth wear-resistant bearing surface for every wire—forms close adherent coating that doesn't drip off unless subjected to high temperature.

HERE'S HOW YOU CAN SAVE MONEY ON WIRE ROPE

Keep an accurate performance record on your present wire rope on applications mentioned above. When it is worn out, switch to J&L CenterFit and compare its performance with what you are now using. We'll gladly send you a wire rope service card with a plastic holder *free!* Write on your business letterhead to: Jones & Laughlin Steel Corporation, 412 Jones & Laughlin Building, Pittsburgh 30, Pennsylvania.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

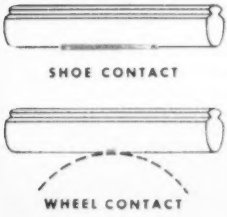
PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

For Heavy Duty Haulage, USE SHOES

• If you want a smooth, dependable flow of power from the trolley wire to the collectors of your main haulage locomotives, use a collector that presents the largest possible area to the wire. That's why shoes—O-B Type-L Trolley Shoes—are better suited to heavy duty haulage than trolley wheels. Here's the reason: Shoes, in the first place, do present a larger surface for current transfer than the wheels. Because of this, current passing from the wire to a trolley shoe passes through what might be called a "line" contact, as contrasted to the "point" contact between the wire and a wheel. An abrupt jog in the wire will break the contact between a wheel and the wire, interrupting the power flow. When this happens, there is a good deal of arcing, for the flow of current has been concentrated through a very small area. However, the current flow is distributed through a series of points in the case of the shoe, and since the shoe is less likely to break contact with the wire, the chances for power interruption and arcing are much less. You see, the pivotal center of the shoe is located in the center line of the wearing surface, eliminating any tendency for the shoe to tilt because of friction between the shoe and the wire. Further, a jog in the wire, while depressing the leading end of the shoe, will press the trailing end more firmly against the wire. The reverse is true when the center of the shoe passes the jog.

Your O-B representative will be glad to tell you more about the advantages of shoe current collection. Ask him what it can do for you in your mines.

4055-M



Field tests show that under identical conditions of heavy electrical load, trolley shoes outlast wheels many, many times. This is because of reduced arcing and burning with the use of shoes. The sketches show the difference in surface covered by the wheel or shoe in contact with the wire.

Ohio Brass

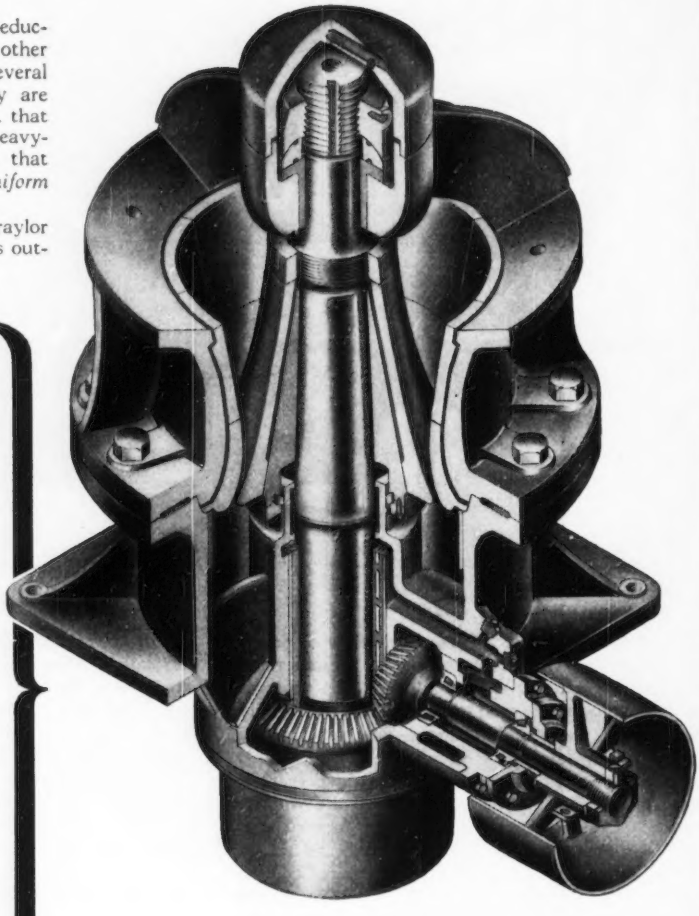
MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Let's be SPECIFIC about reduction crusher Efficiency

We believe that Traylor TY Reduction Crushers are superior to other secondary fine crushers in several ways. We believe that they are *more economical* to operate . . . that they are *more dependable* in heavy-duty, continuous service . . . that they produce a better, more *uniform product*.

Now let's look inside a Traylor TY to see how it achieves this outstanding operating efficiency.



TRAYLOR'S CURVED CONCAVES AND BELL HEAD

produce better aggregate at less cost per ton

LOWER POWER COST

Traylor's curved concaves and bell head apply power as a *direct* crushing force. The eccentric motion of the bell head exerts power *directly counter* to the curved surfaces of the concaves. This stops lifting and churning of material . . . cuts down power loss . . . reduces power costs per ton.

GREATER DEPENDABILITY

Traylor's curved concaves and bell head *eliminate choking and packing*. Each succeeding feed zone is of greater capacity than the preceeding zone. As the material passes thru the crusher it has free fall from each stage of reduction to the next. Costly downtime is avoided . . . lost production is saved.

HIGHER QUALITY PRODUCT

Since there is no choking or packing . . . *no lifting and churning* . . . material flows evenly thru the crushing chamber of a Traylor TY Reduction Crusher. This reduces the percentage of waste fines. The curved crushing surfaces produce a more uniform product at less cost per ton.

WRITE FOR FREE BOOKLET

Many other outstanding design features account for the low maintenance costs and dependable service of a Traylor TY Reduction Crusher. They are fully described in our new Bulletin #5112. Write for your free copy today.

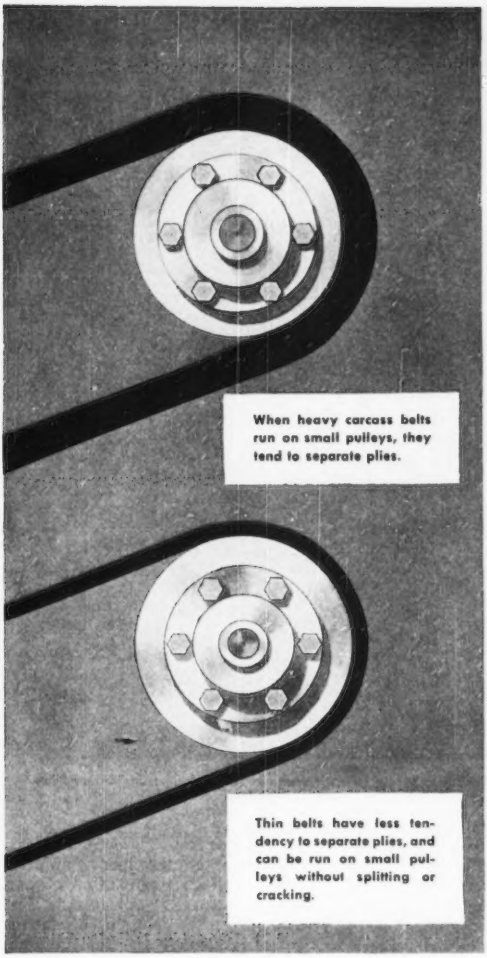
TRAYLOR ENGINEERING & MANUFACTURING CO.
208 Mill St., Allentown, Pa.

Sales Offices: New York, N. Y., Chicago, Ill., Los Angeles, Calif.
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

Traylor

Rotary Kilns, Coolers and Dryers
Grinding Mills . Crushing Rolls
Jaw, Reduction and Gyratory Crushers

A "TRAYLOR" LEADS TO GREATER PROFITS


When heavy carcass belts run on small pulleys, they tend to separate plies.
Thin belts have less tendency to separate plies, and can be run on small pulleys without splitting or cracking.

MORE FLEXIBILITY. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. In addition, they trough well under any loading conditions.

OPERATING ECONOMIES YOU CAN GET FROM YOUR NEXT CONVEYOR BELT

Before you buy your next conveyor belt, be sure to consider the new belts built on Du Pont Cordura* High Tenacity Rayon. Belts sinewed with "Cordura" offer you many operating advantages . . . yet *cost no more.*

Just as sinews of "Cordura" make possible thinner yet stronger truck tires, they now give you a conveyor belt that is lighter and more efficient.

That's because "Cordura" is inherently stronger than natural fibers commonly used. And it is made in continuous filaments . . . with no short ends to pull apart under strain.

We'll be glad to send you the names of suppliers of the new belts built on "Cordura." We'll also give you full information about "Cordura" in the new booklet "Sinews for Industry." It describes the physical properties of "Cordura," how it has been used in many successful applications, and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4529, Rayon Div., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

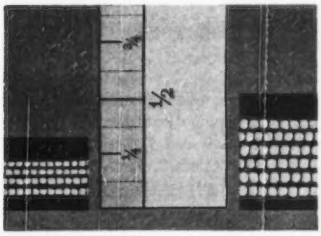
*REG. U. S. PAT. OFF.

DU PONT "CORDURA" HIGH TENACITY RAYON

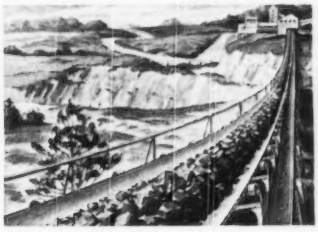
DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

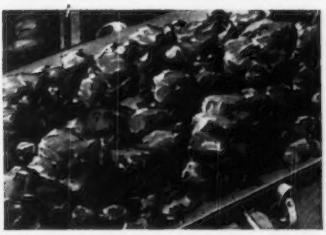
for RAYON . . . for NYLON . . . for fibers to come look to DU PONT



GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional six-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



SPAN LONGER LIFTS. The high tensile strength of "Cordura" rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 tons of overburden per hour up a 15° slope over 1000-foot centers. It has design tension of 900 pounds per inch of width.



HEAVIER LOADING CAPACITY is possible on conveyor belts built with Du Pont "Cordura" High Tenacity Rayon. This yarn is inherently stronger than the natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

Lab Tests Prevent Investment Loss...

How Allis-Chalmers Basic Industries Research Laboratory Minimizes Process Investment Risks

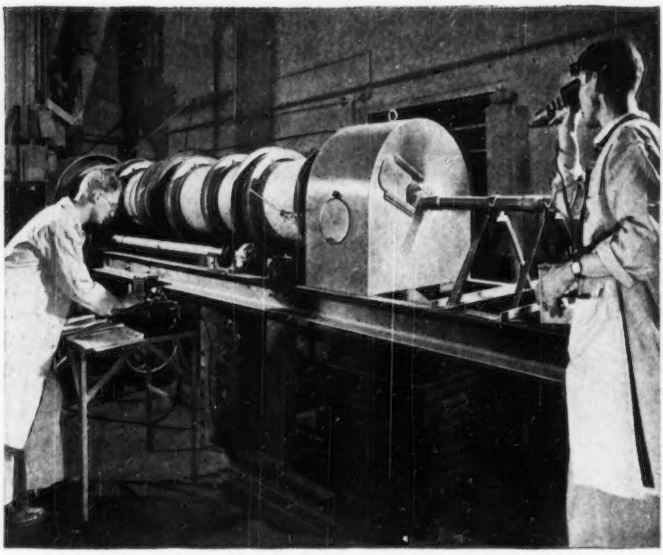
GODFREY L. CABOT, INC., manufacturer of carbon black, wanted to know if it was commercially practical to calcine a high volatile coke in order to obtain a low volatile and regulated density product.

Batch tests, which had been conducted by Cabot engineers, showed that the process had possibilities.

The problem was then brought to the Basic Industries Research Laboratory to determine whether or not the results of batch testing could be duplicated in a pilot rotary kiln.

Tests on pilot scale equipment proved that the process could be carried out profitably on a commercial scale in a rotary kiln and indicated the type and size machinery that would be required.

As a result, with this key problem solved, this processor was able to proceed with confidence in setting up full-scale operations.



Temperatures are being taken by optical pyrometer and thermocouples on 12-ft by 18-in. pilot mill rotary kiln in Basic Industries Research Laboratory.

The Allis-Chalmers Basic Industries Research Laboratory is primarily a service organization. It is manned by technically trained personnel and equipped with the necessary apparatus for investigating process problems that develop in the beneficiation of raw materials.

J. B. Calkins
Pilot Mill
Foreman

Laboratory services include research on the development of new or existing industrial processes . . . research on new machinery, or improvement of oldmachinery . . . fundamental research into the basic principles underlying modern mechanical, process or plant design.

The Laboratory's purpose is to develop new or more efficient methods... to determine the economics of processes prior to full scale production . . . to provide engineering information that will guide in the designing of efficient processing plants.

CAN YOU USE THIS SERVICE?

The services of the Laboratory are available to anyone in industry, regardless of the nature of their processes. All investigations are treated in complete confidence. Information obtained is not made public except with express permission of the sponsor.

The Laboratory is a service organization; charges are based on costs. An estimate for test work can be obtained through your nearest Allis-Chalmers district office, or by writing direct to:

ALLIS-CHALMERS, 969A SO. 70 ST.
MILWAUKEE, WIS.

A-3155

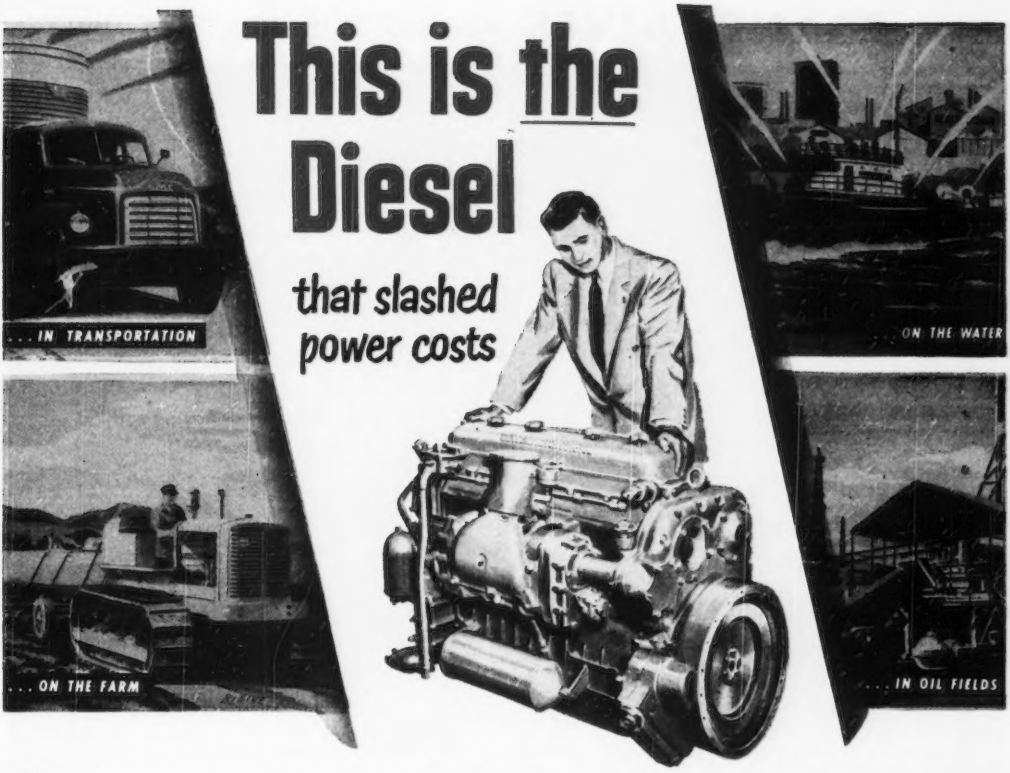
Chemical analyses for control of pilot mill tests are made in this chemical laboratory.

ALLIS-CHALMERS

Basic Industries Research Laboratory — Dedicated to a Better Utilization of Our Raw Materials

This is the Diesel

that slashed power costs



COST-WISE power users know there is a big difference in Diesel engines. They've learned from experience that the GM 2-cycle Diesel gives them the full advantages of this versatile modern power.

The GM Series 71 Diesel—the successful engine that powers over 22,250 city and inter-city buses—also powers a rapidly increasing number of heavy-duty trucks. Operators prefer them because the engines perform a million miles or better with spectacular savings in operating and maintenance costs.

It is this same engine, in single and multiple units, that has made Diesel power famous for economy in every type of power application—from giant shovels to road pavers—from tractors to cotton gins—from oil drilling rigs to pipeline pumps—from workboats to pleasure craft—from industrial locomotives to welding sets—from lumbering machinery to standby generators.

This is because GM two-cycle Diesels deliver power on every piston downstroke—not on every second downstroke like most other Diesels. This makes them smoother, more flexible under loads, easier starting, cleaner burning, lighter in weight—and compact enough to fit almost any installation.

Just any Diesel is not the answer—*the* Diesel is the GM Diesel! 299,975 "Series 71's" have provided the best in Diesel power—*Diesel brawn without the bulk.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up to 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up to 800 H. P.

GENERAL MOTORS

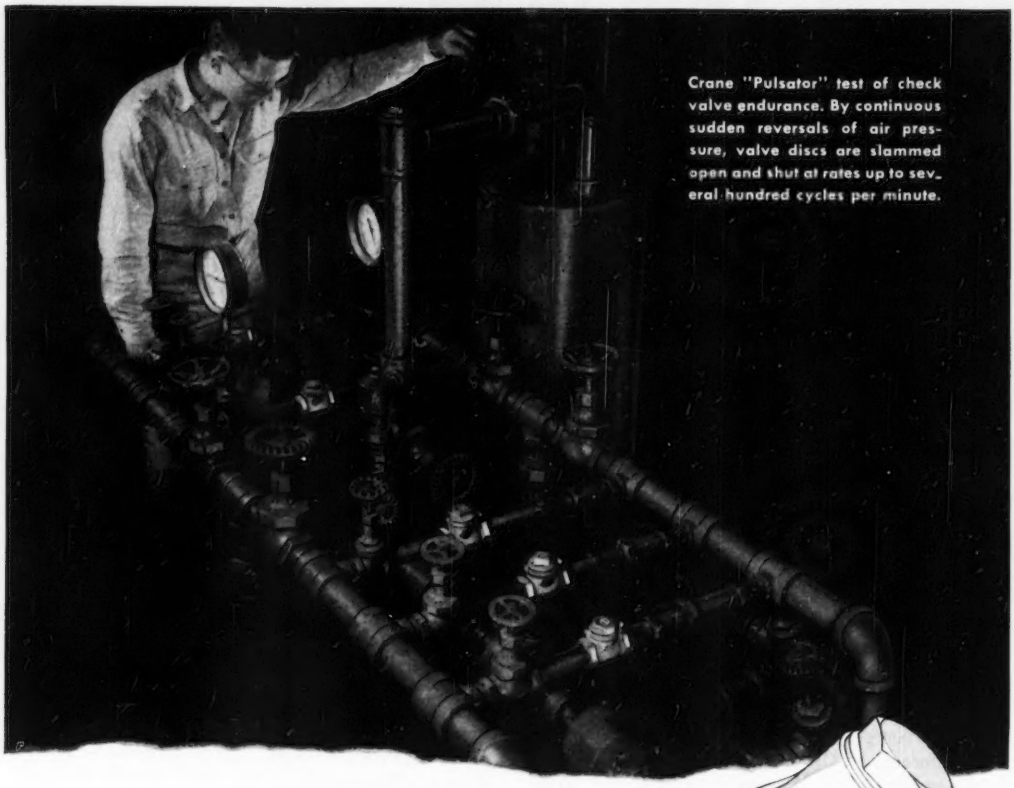
Hear HENRY J. TAYLOR on the air every Monday evening over the ABC Network, coast to coast

Only GM Diesels provide all these advantages

Smaller size, less weight per horsepower • Two-cycle smoothness, power on every downstroke • Quick starting, on its own fuel • Unit injectors—no high-pressure fuel lines • Rapid acceleration • Cleaner burning • Better high-altitude performance • Easy accessibility

GM
GENERAL MOTORS
DIESEL POWER
"Your Key to Power Economy"

More **CRANE VALVES** are used than any other make



Crane "Pulsator" test of check valve endurance. By continuous sudden reversals of air pressure, valve discs are slammed open and shut at rates up to several hundred cycles per minute.

How Many Checks in a Good Check Valve?

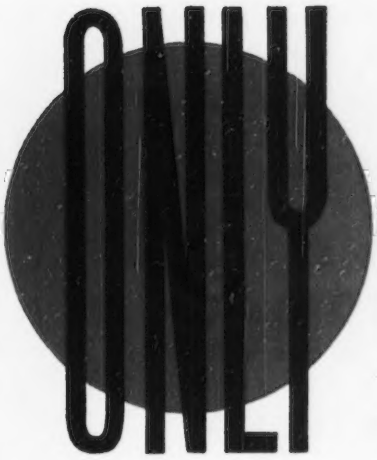
You don't buy them that way, but that's what finally determines the value of check valves in your pipe lines. That's why Crane is so completely equipped for accurately pre-testing valve performance. For instance, "wearability" of check valves is tested by opening and closing the valves continuously on various fluids under conditions of actual service. Special equipment is used to accelerate these tests to equal many years' service in a short period. Countless tests like this—of materials, designs, and finished products—insure the superior performance values that mean lower piping costs for users of all Crane valves and fittings.

This new regrinding Brass Swing Check design typifies Crane's continuing product development for better valve performance, lower piping maintenance costs. For increased flow capacity . . . for fast, positive closure on backflow . . . for easier servicing without removing valve from line . . . get a demonstration of these 200 and 300-Pound Y-Pattern Check Valves. Phone your Crane Representative, or ask for literature.

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



TIREX

HAS THE *Selenium* NEOPRENE ARMOR

Only Simplex-TIREX cords and cables are jacketed with the famous Selenium Neoprene Armor. This famous cured-in-lead jacket is well known wherever tough, hard jobs are found. Whether it is coal mining, ship building, open pit mining operations, rock quarrying or foundry work the tough, cured-in-lead jacket provides the kind of staying power that you want. Wherever rough, abrasive conditions are found, there you will find the jobs that TIREX excels at doing.

Actual service records show that Simplex-TIREX cords and cables have proved to be the most economical because the Selenium Neoprene Armor lasts so long.

Whenever your requirements call for the use of a portable cord or cable, specify and be sure that you get Simplex-TIREX Cords and Cables.

If it isn't made by Simplex it isn't Tirex.

Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.,

Step Up Recoveries

WITH THESE TWO FLOTATION "FIRSTS"

Yarmor® F Pine Oil

Hercules "Yarmor" F Pine Oil has been a standard of quality among pine oils ever since the flotation process became established. Low in cost, it is recognized as the ideal frother for the flotation of sulphide minerals, such as zinc, copper, lead . . . and for non-sulphide minerals, such as mica, quartz, graphite, feldspar, and talc. A relatively new and profitable use is in the salvaging of coal fines for fuel. Here, as wherever a highly mineralized froth is required to support and hold heavy concentrations, "Yarmor" F Pine Oil assures maximum recovery.

Rosin Amine D Acetate

Rosin Amine D Acetate is a new type of collector developed by Hercules for the flotation process. This cationic surface-active material is low in price, has good solubility, and is easy to handle. Rosin Amine D Acetate is employed in the flotation of non-metallic ores, such as feldspar, cement rock, and phosphate rock. It is an excellent collector for silica and siliceous minerals and may have application in the removal of these substances from other ores. Hercules Rosin Amine D Acetate is shipped to flotation users in the form of a water-soluble, 70 per cent paste.

Send for new technical book on Hercules flotation agents

HERCULES POWDER COMPANY

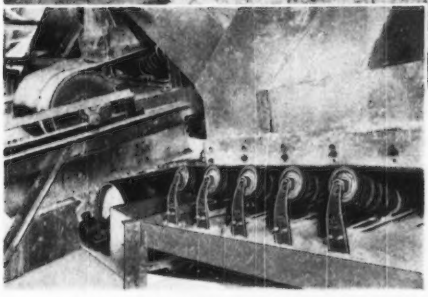
INCORPORATED

933 KING STREET, WILMINGTON 99, DELAWARE

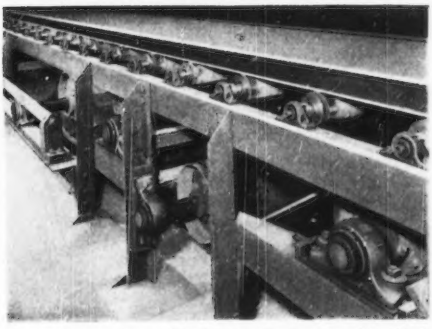
NM50-2

LINK-BELT
Belt Conveyors Fit the Job

A section of a 30" wide Link-Belt roller-bearing belt conveyor handling 500 tons of gypsum rock an hour, showing standard Link-Belt troughed idlers. In the foreground is one of the Link-Belt belt training idlers that prevent damage to the belt from misalignment due to off-center loading, stretch, or improper splicing.



Junction of two Link-Belt roller-bearing belt conveyors showing Link-Belt welded-steel foot pulleys and the rubber-tread impact idlers that absorb the shock of falling material, protecting the idlers and preserving the belt.



Link-Belt standard ball- and roller-bearing pillow blocks and takeups used throughout the flat belt conveyor system which carries wall board.

For materials conveying, whether the problem is tonnage, distance, or a combination of both for any of an almost endless variety of materials, heavy or light, ranging in size from large lumps to fines, for continuous or intermittent operation, it is a Link-Belt job.

Link-Belt designs the belt conveyor system to meet your requirements, builds the various elements, assemblies, supporting structures and enclosures, and installs the job complete. With Link-Belt, experience puts the right equipment in the right place for the specific application and service. Every detail is given the proper attention for trouble-free performance, efficiency, and endurance.

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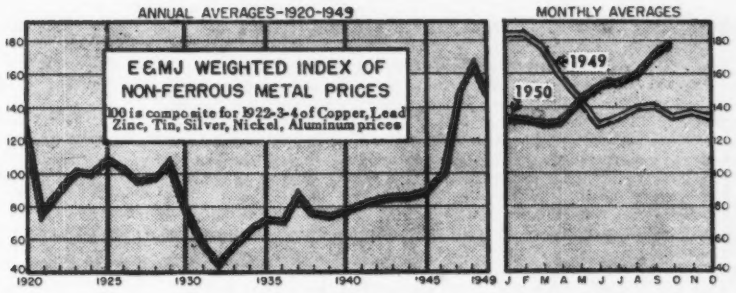
E&MJ OUTLOOK

PRICES


ANNUAL AVERAGES-1920-1949
E&MJ WEIGHTED INDEX OF NON-FERROUS METAL PRICES
100 is composite for 1922-3-4 of Copper, Lead Zinc, Tin, Silver, Nickel, Aluminum prices
MONTHLY AVERAGES
1949
1950
J F M A M J J A S O N D

•

MARKETS

We're going to have to put more lines on our chart if metal prices climb much higher. Higher monthly averages for copper, lead, zinc, tin, and aluminum drove the E. & M. J. index of non-ferrous metal prices to 179.83 for October. September's index was 172.56. The record high for our index was 185.75, set in February, 1949. It slid rapidly from that peak, however, to a low of 131.20 in June, 1949.

Tin set an all-time record of $1.26 per lb., New York, on October 31. Eagerness to buy the metal arose from continued Communist successes along the Indo-China frontier. Lead rose to 17c. on October 31.

Despite clear indications that civilian requirements of copper, aluminum, and zinc will be **restricted by 20 to 30%, buyers keep on scrambling** for all they can get. Fear of possible price control kept the major markets in hand, although outside traders demanded, and got, fancy prices.

•

LABOR

With the Mine, Mill union claiming to have set the industry pattern with a few 10c. an hour wage increases, the CIO Steelworkers will go all out to get 15c. or more in their current wage drive. If the Steelworkers get it (they hold contracts at some non-ferrous metal mines), Mine, Mill will be back for another wage boost in the spring.

•

AT HOME

Uranium from Florida pebble-field phosphate ores will be among the new projects on which International Minerals & Chemical Corp. plans to spend about $10,000,000. (See E.&M.J., Aug. 1950, page 93.)

High-temperature metals for things like jet engines can be made from nickel-aluminum-molybdenum alloys, Canadian metallurgists say. This could take some, at least, of the heat off scarce metals like cobalt and columbium.

There's a chance for someone to get into the nickel business by taking over the old Nicaro Nickel plant in Cuba. RFC has approached several people, but the logical candidates don't seem interested.

An aluminum control order, patterned on the steel order (p. 108), may be out before you read this. Copper and zinc orders will follow.

Don't let signs of deflation fool you. Inflation isn't ended. Credit controls and end-use limitations may relieve shortages, but the real impact of defense spending won't hit raw materials until after January.

•

ABROAD

Although South Africa, France, and Belgium now oppose the International Monetary Fund's ban on premium-price sale of gold, the Fund's directors stand fast. Nor will they even discuss raising the price of gold.

Canada will probably keep right on subsidizing her gold miners just the same. She does so by special arrangement with the Fund.

MARKETS—Trends and Prices

Scramble for Non-Ferrous Metals Continues — Priorities Order Issued — Tin at Record High

THOUGH SOME INDUSTRIES may have experienced a slackening in operations from the hectic pace of recent months, steel and non-ferrous metals remained unusually active throughout October. "Protective" buying continued in commodities that were thought likely to come under some form of Government control. The price situation was strong. In a really free market, producers easily could have obtained much higher prices under the inflationary conditions that continue to beset the country's economy. Substantially higher prices were paid for copper and zinc in the outside and speculative markets, here and abroad. Scrap prices were completely out of hand and well above primary metal equivalents.

Higher monthly averages in copper, lead, zinc, tin and aluminum caused the E & MJ index of non-ferrous metal prices to rise to 179.83 in October, against 172.56 in September and 137.81 in October a year ago.

Effective Oct. 3, the National Production Authority established a priorities system that directs all plants to accept any order bearing a "DO" (defense order) symbol. The symbol could be extended to cover a supplier's needs for fuel, power, transportation and warehousing. A ban on construction of new buildings intended for amusement or entertainment purposes was announced Oct. 26. NPA revealed that consumption of copper, aluminum and nickel for civilian use will be reduced by 20% or more around Dec. 1. Production and use of columbium-bearing steels has been reserved for defense needs. Cobalt is moving into the same critical position.

Copper Maintained at 24½c.

In spite of the fact that moderate tonnages of copper were sold in the outside market at prices ranging all the way from 28c. to 40c. per pound, producers held to the 24½c. basis. The supply remained extremely tight, with no improvement expected until civilian requirements are finally cut back sufficiently as an offset to an increasing volume of defense orders. New supply of copper should increase, owing to the rise that has occurred in prices in recent months, but the gains in sight are hardly sufficient to alter the situation greatly one way or the other. Costs are still rising.

Production of crude copper in the United States during September, according to Copper Institute, totaled 85,785 tons, of which 79,901 tons was primary and 5,884 secondary.

Refineries produced 111,842 tons of copper in September, against 108,465 tons in August. Deliveries of refined copper to domestic consumers amounted to 119,529 tons in September. In addition, producers shipped 19,217 tons of copper to the Government for its stockpile.

A summary of the August and September statistics, in tons, follows:

United States

Production:	(a) Aug.	Sept.
Crude, primary	80,620	79,901
Crude, secondary	11,760	5,884
Totals	92,380	85,785
Refined copper	108,465	111,842
Deliveries, refined	112,083	119,529
Stocks at end, refined..	50,952	58,748

Outside United States

Production:	(a) Aug.	Sept.
Crude, primary	119,938	106,003
Crude, secondary	1,658	616
Totals	121,596	106,619
Refined copper	100,195	93,507
Deliveries, refined	63,922	85,809
Stocks at end, refined..	157,541	133,379

(a) Corrected

Though stocks of refined copper in the United States increased by 7,796 tons during September, the supply in the hands of foreign producers was reduced by 24,162 tons. Combined domestic and foreign holdings of refined copper at producers' plants at the end of September totaled 192,127 tons, against 208,493 tons a month previous.

Lead Raised to 17c., N. Y.

Demand for lead remained quite active throughout October. The price situation strengthened as foreign buyers came into the market at higher prices. The quotation continued at 16c., New York, until the last day of the month, when leading sellers moved up the basis of 17c. In the foreign division of the market business was noted at 17½c. to 18c., f.a.s. Gulf ports.

Lead refineries in the United States produced 50,137 tons of pig lead in September, against 47,242 tons in August. Shipments by primary refineries in September came to 55,948 tons, against 47,031 tons in the preceding month. Stocks at the end of September totaled 61,171 tons, against 67,495 tons at the end of August.

During August, the United States imported 38,879 tons of refined lead, making the total for the Jan-Aug. period 277,213 tons.

Consumption of lead (primary and secondary) in the United States during seven months ended July totaled 584,183 tons, the Bureau of Mines reports. In July, consumption was estimated at 88,281 tons.

Zinc Extremely Tight

Producers feel certain that the position of zinc is even tighter than that of copper. The September statistics of the American Zinc Institute showed stocks of slab zinc in the hands of domestic smelters as amounting to only 10,267 tons, the lowest since 1925. Production in September amounted to 71,057 tons, against 73,399 tons a month previous. Total deliveries of 75,241 tons during September fell far short of what the industry could have moved if the metal were available. Some producers dropped behind in making deliveries to the Government for its stockpile, owing to causes beyond their control.

Consumption of slab zinc in the

Average Prices for October (E&MJ Quotations)

Copper:	
Electrolytic, Domestic, Refinery	24.200
Electrolytic, Export, Refinery	24.425
Lead:	
Common, New York	16.040
Common, St. Louis	15.840
Silver and Sterling Exchange:	
Silver, New York, per oz....	75.060
Silver, London, pence per oz...	65.182
Sterling Exchange, "Checks"	280.000
Zinc:	
Prime Western, East St. Louis	17.500
Tin:	
New York Straits.....	113.420
New York, 99% min.....(e)	112.420
Gold, per oz. U.S. price....	$35.000
Quicksilver, per flask.....	$89.520
Antimony (E&MJ) (d)....	35.280
Antimony, bulk, Laredo....	32.000
Antimony, in cases, Laredo	32.500
Platinum, refined, per oz...	$95.200
Cadmium (a)	240.000
Cadmium (b)	252.500
Cadmium (c)	265.000
Aluminum, 99% plus, ingot	19.000
Magnesium, ingot	24.500
Nickel (f)	48.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange, checks, in cents. Quicksilver, per flask of 76 lb.

(a) Cadmium average based on the producers' quotation.

(b) Cadmium average based on the average of the producers' and platers' quotation.

(c) Cadmium average based on platers' quotation.

(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.

(e) Tin contained.

(f) F.o.b. Port Colborne, U. S. duty included.

United States in August was estimated by the Bureau of Mines at 88,290 tons, the highest since March, 1945, when the all-time record of 91,286 tons was established.

Though producers maintained the price on the basis of 17½c. for Prime Western, East St. Louis, foreign buyers paid between 21c. and 22c. per pound on metal of foreign origin, f.a.s. Gulf ports.

Political tension in the Far East was chiefly responsible for the continued rise in tin prices to the highest level on record. Covering by shorts abroad made for sharply higher prices toward the end of the month. Standard tin on the London Metal Exchange jumped from £791 per long ton on Oct. 2 to £980 on Oct. 31. In New York, Straits quality tin advanced to $1.26 per pound, prompt delivery.

Withdrawal of the National Bank of Mexico as a seller, pending study of a proposal to impose an export tax, caused the price of foreign silver to advance to 80c. an ounce troy.

Effective Dec. 11, the duty on tungsten ore will go back to 50c. per pound of W contained, and antimony metal to 2c. per pound, under a Presidential proclamation withdrawing concessions originally made to China.

(*Continued on page* 110)

Major Metals

U. S. DAILY AND AVERAGE PRICES

	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
Oct., 1950						
2	24.200	24.425	104.000	16.000	15.800	17.500
3	24.200	24.425	106.000	16.000	15.800	17.500
4	24.200	24.425	106.500	16.000	15.800	17.500
5	24.200	24.425	106.000	16.000	15.800	17.500
6	24.200	24.425	107.500	16.000	15.800	17.500
7	No Market	24.425	107.500	16.000	15.800	17.500
9	24.200	24.425	109.250	16.000	15.800	17.500
10	24.200	24.425	111.500	16.000	15.800	17.500
11	24.200	24.425	112.000	16.000	15.800	17.500
12	Holiday	24.425	Holiday	Holiday	Holiday	Holiday
13	24.200	24.425	111.375	16.000	15.800	17.500
14	No Market	24.425	111.375	16.000	15.800	17.500
16	24.200	24.425	111.500	16.000	15.800	17.500
17	24.200	24.425	112.500	16.000	15.800	17.500
18	24.200	24.425	113.250	16.000	15.800	17.500
19	24.200	24.425	113.000	16.000	15.800	17.500
20	24.200	24.425	114.000	16.000	15.800	17.500
21	No Market	24.425	114.000	16.000	15.800	17.500
23	24.200	24.425	116.000	16.000	15.800	17.500
24	24.200	24.425	117.500	16.000	15.800	17.500
25	24.200	24.425	118.750	16.000	15.800	17.500
26	24.200	24.425	119.750	16.000	15.800	17.500
27	24.200	24.425	121.000	16.000	15.800	17.500
28	No Market	24.425	121.000	16.000	15.800	17.500
30	24.200	24.425	124.250	16.000	15.800	17.500
31	24.200	24.425	126.000	17.000	16.800	17.500
AVERAGES FOR MONTH						
Oct.	24.200	24.425	113.420	16.040	15.840	17.500
AVERAGES FOR WEEK						
Oct.						
4	23.625	24.425	104.000	16.000	15.800	17.500
11	24.200	24.425	108.958	16.000	15.800	17.500
18	24.200	24.425	112.000	16.000	15.800	17.500
25	24.200	24.425	115.542	16.000	15.800	17.500
CALENDAR WEEK AVERAGES						
Oct.						
7	24.200	24.425	106.250	16.000	15.800	17.500
14	24.200	24.425	111.100	16.000	15.800	17.500
21	24.200	24.425	113.042	16.000	15.800	17.500
28	24.200	24.425	119.000	16.000	15.800	17.500

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(*a*) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.003c. per pound, the average differential for delivery charges.

(*b*) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West command a premium of 1.10c. per pound over the current market for Prime Western; Special High Grade 1.25c.

Quotations for lead are for common lead. Corroding lead commands a premium of 10 points.

(*c*) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and one-eighth cent fractions per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(*d*) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
Oct., 1950					
2	$280.000	72.750	63.500d.	248s.	$35.00
3	280.000	72.750	63.500d.	248s.	35.00
4	280.000	72.750	63.500d.	248s.	35.00
5	280.000	72.750	63.500d.	248s.	35.00
6	280.000	72.750	63.500d.	248s.	35.00
7	(e)	(e)	(e)	(e)	35.00
9	280.000	72.750	63.500d.	248s.	35.00
10	280.000	72.750	63.500d.	248s.	35.00
11	280.000	72.750	63.500d.	248s.	35.00
12	Holiday	Holiday	63.500d.	248s.	Holiday
13	280.000	72.750	63.500d.	248s.	35.00
14	(e)	(e)	(e)	(e)	35.00
16	280.000	72.750	63.500d.	248s.	35.00
17	280.000	72.750	63.500d.	248s.	35.00
18	280.000	72.750	63.500d.	248s.	35.00
19	280.000	72.750	63.500d.	248s.	35.00
20	280.000	72.750	63.500d.	248s.	35.00
21	(e)	(e)	(e)	(e)	35.00
23	280 000	77.750	63.500d.	248s.	35.00
24	280.000	80.000	68.000d.	248s.	35.00
25	280.000	80.000	70.000d.	248s.	35.00
26	280.000	80.000	70.000d.	248s.	35.00
27	280.000	80.000	70.000d.	248s.	35.00
28	(e)	(e)	(e)	(e)	35.00
30	280.000	80.000	70.000d.	248s.	35.00
31	280.000	80.000	70.000d.	248s.	35.00
AVERAGES FOR MONTH					
Oct.	280.000	75.060	65.182d.	—	35.00
AVERAGES FOR WEEK					
Oct.					
4	280.000	72.750	—	—	—
11	280.000	72.750	—	—	—
18	280.000	72.750	—	—	—
25	280.000	76.650	—	—	—

Calendar week averages, New York Silver: Oct. 7th, 72.750; 14th, 72.750; 21st, 72.750; 28th, 79.550.

(*e*) No market (Saturday).

Behind the By-Lines . . .

G. P. Lutjen

» **As a bona fide,** everyday human being, you may have had a little difficulty figuring out E&MJ's cover design this month. Or perhaps you associated it with that phenomenon which occurs when you gently but firmly remove the plug from the bottom of your bathtub.* However, if you were a mineral particle of average intelligence you would recognize it immediately as the sight you see on entering one of the new Dutch State Mines cyclones on business. We do this sort of thing to focus your attention on the article on page 78, which describes a new plant for treating phosphate rock. Use of cyclones for desliming flotation feed is only one of the new and novel activities described. **Arthur Crago,** general manager of American Cyanamid's Brewster property, who certainly knows as much about treating Florida phosphates as anybody, tells about two other equally unorthodox set-ups which you should find stimulating.

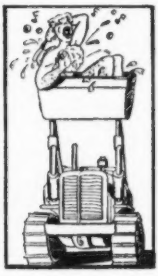
» **The Mystery Men** this month are from Balmertown, Ontario, and Los Angeles, Calif. Both gentlemen are obviously interested in obtaining more information about various products featured in New Products Digest for September, but both seem to be sans name, sans address, sans company, and so, sans information. Nothing about Los Angeles surprises us any more, but Balmertown—tsk, tsk!

» **It's a rare bird** that will set up housekeeping in a stope 75 ft. underground, but apparently the housing situation for robins around the Hollinger mine is pretty desperate. At any rate, despite the fact that drilling, blasting and mucking were being carried on in the stope, this robin stayed right on the job, all spring, guarding her future family, four little blue eggs, and even seemed to enjoy a bit of company, as the above picture shows.

The Hollinger Miner, to whom we are indebted for this avian note, informs us that last year the birds built on a ledge of rock at the opening of the stope. However, miners move the nest back to the timber to protect it from blasting. Taking the hint, this year the birds moved to the safer spot, which is some distance from the opening to surface.

*Of course, if you live in the southern hemisphere, the swirl is counter-clockwise.

» **Manufacturers are carrying the trend** toward the microscopic a little too far. We just heard about screws currently being made that are so tiny, one million of them weigh just about one pound. These screws, considerably smaller in diameter than a small needle (or a large hair) are completely threaded and slotted. They are used in adjusting the balance wheels of watches and in military timing instruments. Come to think of it, I have five old razor blades at home that they can make a couple of hundred thousand screwdrivers out of if they want to.



» **Ordinarily you find the Operating Ideas** department somewhere in the middle of the book (p. 111) this issue), but here is one we just couldn't shoehorn in back there. This novel idea for getting full use of your loading machine on Saturday night came from a recent issue of the *Allis-Chalmers Reporter.* Note that the more sensitive bathers can always warm up their tubful of water over the conveniently located exhaust pipe. No place to hang your bathrobe, though.

» **Response to the July paragraph** on hand drilling contests at Tonopah makes it clear that the old time art is still dear to the heart of many a mining man. We hereby pass on a host of congratulations to the winning team at Tonopah, Blake and Harwood.

It might interest them to know that 38 years prior to their own victory, the famous team of Page and Pickens won the July 4th contest at Tonopah with 45 7/16 in. of hole in 15 min. in the same Rocklin granite. Although, as **F. E. Browne** of Auburn, Calif., points out in reporting these figures, Page and Pickens averaged 3.029 in. per min., as compared with Blake and Harwood's 1.506 in. per min, it must be remembered that many of the great double jack teams of yesterday practiced for weeks for a single contest and many of them did little else for a living.

Our authority for this statement is a story in the January, 1938, issue of *Compressed Air Magazine,* a copy of which was kindly sent to us by Editor **C. H. Vivian.** The article covers a great deal of the history of hand drilling contests and it points out among other things that Gunnison granite was generally considered the official rock for championship contests. The record on this basis is held by **Maka** and Chamberlain, who at Bisbee in 1903, drilled 46⅝ in. in the official contest time, 15 min. This is really phenomenal when you consider that team changed steel once a minute and that once a minute they exchanged position; the twister became hammerman and vice versa.

According to the Compressed Air article, the single Jack record was also made at Bisbee in 1903 when Fred Yockey drilled 26⅝ in. However, a letter from **F. D. Shuck** of Glendora, Calif., informs us that Yockey drilled 31 in. in Gunnison granite on Labor Day, 1901, at Pinnacle Park, Cripple Creek.

ENGINEERING AND MINING JOURNAL

NOVEMBER, 1950

Only Adequate Prices Can Hold Manpower

CAN MINING HOLD its manpower? The present figures of at least $50 billion annually for defense suggest important manpower competition.

If manpower shortages develop, the mining and smelting industry, with no men to spare, will be in a difficult position. In certain localities, at least, other industries, particularly those working on Government contracts, are reported to be outbidding mining on wage scales.

To meet such a situation, we have little faith in regulatory action by Government. Not only will all kinds of loopholes be found in any regulatory scheme, but the Government is going to tread very carefully, and rightly so, in applying compulsions against basic individual freedoms. By the time any regulatory mechanism, if tried, can be made effective, we feel sure that serious impairment of the industry will have occurred.

The best and only trustworthy remedy is that mining must compete successfully for adequate manpower according to criteria that really govern men's choices of jobs. These are: earnings, the arduousness of the job, the pleasant or unpleasant aspects of the working environment, fairness of treatment, safety, living conditions, and opportunities of families for education and recreation.

"But," the operator will say, "I am doing all I can along these lines within the prices available to me for my output. What can I do to improve prices and thus my opportunity to compete?"

Unfortunately, there is no easy answer. The individual cannot raise prices alone, and the law forbids collusive action. In a more or less free market, normal price reactions will eventually do what is necessary, but in a painful way. What is needed is general realization that not only are metals and minerals selling too cheaply in the present economy, but that they have been selling too cheaply for years, if the owners of mining properties will look at replacement costs rather than simple production costs. By ordinary criteria, mining is one of the low-profit industries. Prices must go up and stay up, relatively, if the industry is going to hold its manpower and do the job of replacing mineral reserves that the public interest and national security warrant.

How Much Defense Metal?

IF THE AMERICAN PEOPLE do not relax their efforts to achieve a safe level of armament, the producers of short minerals like copper, aluminum and zinc will be in a particularly critical position. Raw material supplies not readily expansible will probably prove to be the production bottlenecks which will make controls necessary. Industrial manpower can be extended with machinery and better methods, and by the employment of women now otherwise engaged. Total manufacturing plant capacity is probably sufficient to meet requirements. But to expand copper and zinc production importantly means finding and developing new mines. To expand aluminum production means the construction of new reduction and power plants, if not alumina plants.

But behind the exploration and production problems, difficult planning and financial decisions are necessary. What is the amount of production actually needed, and can investments made to attain it be amortized?

The answer to the first question is complicated by the fact that nobody really knows what level of production to regard as normal for these times. We know that, except for a brief recession in 1949, demands have existed for more copper, zinc and aluminum than were produced. But this market has been affected by three large temporary factors, stockpile purchases, ECA-financed purchases, and a war-generated backlog of unfilled consumer wants that nobody can measure accurately. What will average requirements be after these temporary factors disappear and the surge of defense and military aid requirements is past? We know that the economy is expanding, but how fast?

Nobody can answer accurately, but it is predictable, given a continuation of the defense effort for the next two or three years, that the copper, zinc and aluminum industries will be urged to provide more capacity than sober judgment indicates can be kept in operation. If shortages of such materials prove to be the reason why controls must be endured, the pressures will be tremendous.

How to Deal with

The reader who expects to do business with the defense agencies of Government will find the time well spent that is devoted to understanding the complicated organization that is being set up and just how to approach it with his particular problem. In brief, except for ores, concentrates, and unrefined smelter products, Commerce will handle such allocations of output and use limitations as are found necessary. Interior in Washington will deal with the flow of ores, concentrates, and unrefined metals, and requests of mines, quarries, smelters and refineries for Government aid in obtaining their needs, whether material or financial. Applications for accelerated amortization should go to the NSRB.

OUT OF THE CONFUSION which has beset Washington's early handling of the defense effort, a sufficient pattern now emerges to warrant an effort to portray the picture. Nobody assumes that this initial pattern will be permanent, but at this point opinions diverge.

Allocation Headaches

In any event, it is evident that trouble is brewing on the allocation front, and that many individual aches and pains will be suffered before allocation machinery is really working. Even if a plan were in being that would anticipate all the problems, no organization can be built up to handle them as fast as they will arise.

Nobody knows at the present time how severe shortages are going to be and to what extent controls will be found necessary. Right now the defense "take" of zinc, copper, aluminum, and possibly steel, looks large enough to create a real problem, one that in the case of the first three will probably require prohibition or limitation of use in certain applications regarded as less essential, as well as the credit, inventory and "DO" priority regulations already in force. If such restraints are not set up over end uses the pressure of demand for the portion of supplies left after defense and essential needs are satisfied will probably drive prices to heights where price control will be necessary as an anti-inflationary step.

The first control applied, and recently tightened, was to restore Federal Reserve "Regulation W" which restricts the liberality of credit terms to purchasers of such items as appliances, automobiles and housing. One can expect these to cut deeper until demand is reduced to digestible proportions.

The second control, issued by the National Production Authority, Department of Commerce, was a mandate to users other than "ultimate consumers buying for personal or household use" to hold inventories to a "practicable minimum working" level. This in general means that unless users are accustomed to carry extraordinarily large inventories, they will be expected to maintain a ratio of inventory to production not exceeding that of the recent past. The inventory regulation applies to Portland cement, gypsum products, alcohol, benzene, caustic soda, chlorine, glycerine, soda ash, lumber (not including railway or mine ties) soft plywood, wood pulp, pig iron, steel, iron and steel forgings and scrap, aluminum, columbium, cobalt, copper, magnesium, manganese, nickel, tin, tungsten, zinc, nonferrous scrap, rubber, burlap, cotton pulp, rayon yarn and nylon.

The third control already in force is a priority order issued by the same agency permitting those authorized by the National Production Authority (Defense Establishment and Atomic Energy Commission, to date) to issue simple "DO" priority ratings with their orders which entitles them to a preferred status over that of ordinary customers. People receiving these "DO" orders are authorized to extend them to their own suppliers, for purposes only of fulfilling the "DO" orders. However, they can only be extended for materials or components which will be "physically incorporated" in the material they will deliver, and not for capital goods, or maintenance, repair and operating supplies.

Under this order, which covers only those items over which the Department of Commerce has primary jurisdiction (excluding electric power, coal, oil, gas, forest products, ores and concentrates, mineral aggregates, transportation and water) suppliers can avoid compliance (a) if delivery would interfere with delivery of rated orders already in hand, (b) if delivery cannot be made when needed, (c) if the buyer will not accept established prices which do not discriminate against him, (d) if the request is for a product not ordinarily offered by the seller, or (e) if the buyer is in the same business as the seller.

If the steel order issued Oct. 12 by NPA sets a precedent, the agency will designate a percentage of output beyond which sellers are not required to honor "DO" orders unless especially directed to do so. This, in effect, sets up a pool for defense requirements.

The law and the priority regulation provide immunity from damage suits where non-fulfillment of contracts is due to fulfillment of "DO" orders.

Interior Is Claimant

The direct import of the present pattern to mining (except coal) and smelting is fairly simple. The products of the metal mines, mills and smelters will be allocated by Interior, insofar as necessary. After the refined ingot, ferroalloy or comparable product stage is reached, the allocation will be handled by Commerce. Thus, the sellers of ores and concentrates will have their outputs allocated by Interior, if allocation is undertaken. The sellers of slab zinc, pig aluminum, ferromanganese, and non-metallic products will have Commerce exercising the same jurisdiction.

When it comes to seeking Government help in satisfying needs

Defense Agencies

for equipment, supplies, manpower, and transportation, the mines, smelters and refineries (including quarries, sand, gravel and clay pits, construction mineral producers, fertilizer mineral producers, and iron mines) should lodge claims with the Defense Minerals Administration, Dept. of Interior, Washington, D. C., which is the "claimant agency" for metals and minerals. However, it is urged on the one hand that operators should do all they can to take care of themselves before seeking Government assistance, so that a new, imperfect and undermanned mechanism is not broken down by overloading. On the other hand, operators are urged to anticipate their real needs for help as far ahead as possible and communicate them to the Defense Minerals Administration, so that a reasonable time is given to provide the necessary help before shortages stall production.

When Interior's Defense Minerals Administration receives these requests, they will be studied critically and, if approved, the unit will then do its best to obtain the requirements through the various agencies having primary jurisdiction. These are: for power, coal, oil, ores and concentrates, Interior Department; for transportation within the U. S. A., Interstate Commerce Commission; for agricultural products, Department of Agriculture; for manpower, Labor Department, and for all other items, including metals, nonmetallic minerals, and manufactured goods, the Department of Commerce. Possibly, considering the desirability of coordinating allocation of these various items, an interagency allocation authority will be set up, but this point is as yet undecided.

After studying the various demands of the several claimant agencies, the agency having primary jurisdiction (or the interdepartmental allocating authority, if formed) will tell each claimant agency what percentage of its total requests can be honored. In the case of mine, quarry, and smelter operators, it will then be up to the Defense Minerals Administration to apportion the totals allocated to it out to individual operators according to its own judgment. Each operator, to the extent that his requests are sanctioned, will then be allowed to attach a priority designation to his orders, but further details of this procedure are not yet worked out. Presumably he will be given a "hunting license." The operator possessing a "hunting license" may have to check back with the agency having primary jurisdiction to ascertain what seller is able to serve him. However, he should first take his "hunting license" to the seller with whom he is accustomed to do business, and come back to Government only if this and other sellers known to him maintain that they are not in a position to serve him.

Manufacturers of mining machinery should apply to Commerce (NPA Machinery Division) for their spot requirements if they need Government help but report to Interior's Defense Minerals Administration their anticipated requirements to avoid over-all shortages of types of machinery.

Production Encouragement

The domestic operator or promoter who seeks to sell minerals or metals to Government or to obtain Government financial assistance for technological research, exploration, development, production, or expansion has three organizations with whom to negotiate, depending on the kind of terms he seeks. If he wants to make a routine contract for delivery of material to the stockpile, in conformance with stockpile specifications, he should apply to the Emergency Procurement Service, General Services Administration, Washington, D. C. If he wants a bank-type loan, with customary interest, collateral, security, and terms, the Reconstruction Finance Corp. is in business as usual. Both these agencies are continuing operations under statutes in force before the Korean war.

However, if he seeks unorthodox financial aid, under the virtually unlimited powers granted to the Executive under the Defense Production Act (E&MJ, Oct., p. 71), then he should apply to the Defense Minerals Administration, Dept. of Interior, Washington, D. C. (Applications to Bureau of Mines regional offices under pre-existing instructions will be forwarded.) After preliminary scrutiny in Washington, field examinations will be made by the staffs of the regional offices of the Bureau of Mines and by field personnel of the Geological Survey and Reconstruction Finance Corp.

When Defense Minerals Administration has satisfied itself of the feasibility of a project, it can certify the project for Government financing in three different ways: 1. By a private bank loan with the bank's risks guaranteed through the Federal Reserve Banks if the borrower needs the funds to fulfill a Government contract; 2. By a purchase contract under extraordinary terms with the General Services Administration, either for stockpiling or for resale; and 3. By an R.F.C. loan under extraordinary terms. However, as the law is now interpreted, Government will extend financial aid only if unavailable from private sources on reasonable terms.

No one can yet state how far the Government will go in making extraordinary terms, whether as to risk assumed, interest, repayment terms, character or competence of borrower, collateral, or liens. However, it can be assumed that the Government will be prepared to assume a substantial share (but not all) of the financial risks of enterprises its technical examiners deem feasible; otherwise, the broad authority conferred upon the President under the law and special mention of mineral exploration and development would be meaningless.

Five-Year Amortization

Applicants who wish to qualify for the 5-year amortization privilege granted under the recent tax bill (E&MJ, October, p. 106) should lodge their applications with Mr. W. Stuart Symington, chairman, National Security Resources Board, Washington 25, D. C. The NSRB chairman will issue "certificates of necessity" if, after conferring with Interior's Defense Mineral's Administration, a favorable finding is made. Forms for this purpose can be obtained from field offices of the Bureau of Mines or Dept. of Commerce.

The accelerated amortization privilege—a tax benefit if the tax-

payer expects the next five years to show higher taxable income or higher tax rates than subsequent years—was set up by Congress as an incentive to erect such new facilities as are required for defense.

Foreign Aspect Doubtful

The extension of Defense Production Act authorizations into the foreign field is doubtful. The Act authorizes purchases at "higher than current prevailing market prices or anticipated loss on resale" of "such purchases (as) are necessary to assure the availability to the United States of overseas supplies." The Act also includes foreign governments and their political subdivisions as "persons" under its provisions. However, the advancement of financial assistance for research, exploration, development and production is authorized to "private business enterprises," not to "persons." Also a general provision (Sec. 713) states: "The provisions of this Act shall be applicable to the United States, its territories and possessions, and the District of Columbia."

This would suggest that purchases can be made in the foreign field but that other financing of mineral development cannot, unless under other legislation, such as the appropriations for Point IV, or the acts establishing the Economic Cooperation Administration, the Export-Import Bank and U. S. participation in the World Bank. Obviously the allocations, restraining orders and wage and price stabilization powers cannot be imposed on foreign governments and citizens except with respect to business transacted within the U. S. A.

Interior Organization

In Interior, separate organizations have been set up to handle the Department's defense responsibilities. Head of the Defense Minerals Administration is Dr. James Boyd, director of the Bureau of Mines. Similar and separate organizations have been created to handle power, coal and oil problems.

Dr. Boyd has virtually vacated the Bureau of Mines directorship to organize and lead the defense minerals unit, which will: (1) receive applications for the needs of mines, quarries, mills, smelters, and refineries for equipment, supplies, manpower and transportation; (2) regulate the outputs of mines, quarries, mills and smelters to the extent deemed necessary; (3) certify to banks, RFC or the General Services Administration the appropriateness of research, exploration, development and production projects for extraordinary purchase or financing terms; and (4) make recommendations to NSRB on mine, smelter and refining applications for accelerated amortization.

Thus, the defense minerals unit will establish the policies under which encouragement to production is made, including any such devices as subsidies or bonuses. After certification is granted, the activity of R.F.C. or G.S.A. will be more or less mechanical, restricted to aspects on which they have special competence, such as examinations of collateral and financial integrity by R.F.C., and specifications, delivery schedules and delivery points by G.S.A. The latter will be custodian of purchases, whether for stockpiling or for resale. In short, Defense Minerals Administration will not issue any checks, but will authorize their issuance by others.

Commerce Setup

The Department of Commerce has also created a separate defense organization to handle its own part of the functions delegated to it by Executive Order under the Defense Production Act. This organization is known as the National Production Authority, and will take jurisdiction over manufacturing, distribution, metals and minerals at or beyond the ingot stage or point of entering commerce, and allocation of all other items not placed under separate jurisdiction.

The National Production Authority will not only deal with matters over which it has primary jurisdiction, but the delegation of claimant and allocation functions affecting the mineral industry to Interior includes a covenant that policies pursued in this particular field shall be in consonance with broad production policies established by Commerce (or by interdepartmental agreement, in case an interdepartmental coordinating agency is set up).

Economic Stabilization

Anticipating that in some cases, price control may be necessary, thus, under the law making wage and profit control of the affected industry mandatory, the President has set up an Economic Stabilization Agency, and has appointed Dr. Alan Valentine, formerly president of Rochester University, and chief of E.C.A.'s mission to Holland, as its administrator. However, no industry is yet subject to such controls.

N.S.R.B. an Umpire

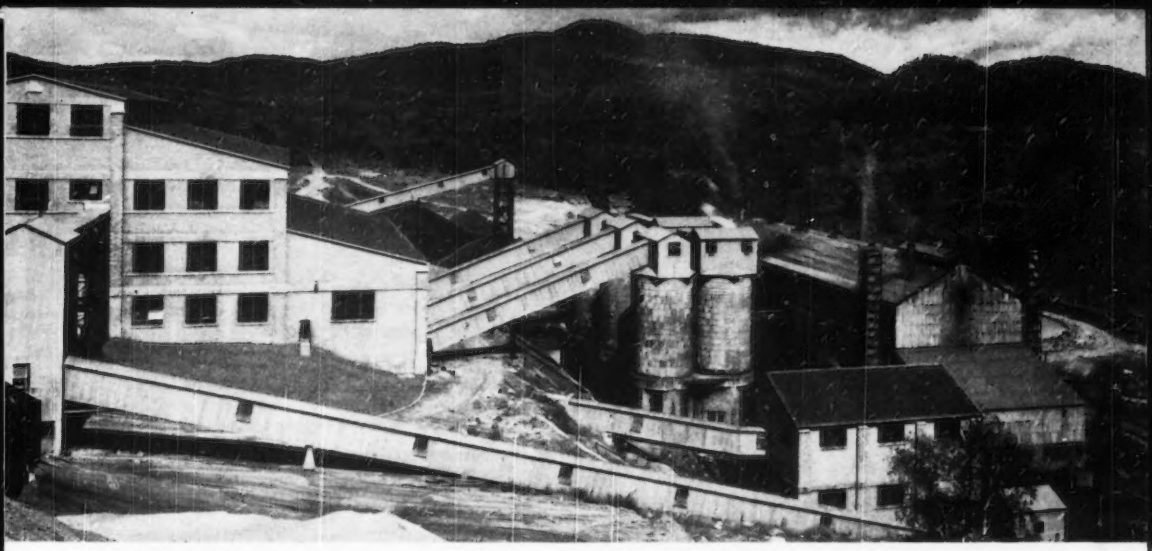
Despite the legislative intent that the National Security Resources Board should become the focal point of emergency activities concerning resources, the organization seems to be pretty much on the sidelines in the present picture. All power is now vested in the chairman, Stuart Symington, whose role is publicized as that of an umpire when defense agencies cannot agree. The Board's personnel are simply observers and are not participating in executive functions. Symington will issue certificates of necessity for successful applicants for accelerated amortization, after consulting with other agencies.

However, Symington seems to be more and more a mouthpiece of highest authority on defense matters behind the scenes. Thus, it seems reasonable to assume that NSRB will occupy a more conspicuous position as time goes on, and may take over the main defense job if the present scheme founders.

Future Unpredictable

No basis exists at the present time to make anything but guesses as to the future changes that may be made in Government handling of defense. The extent of control necessary will depend on such factors as: how much the defense effort will cramp the civilian economy, commodity by commodity; to what extent manufacturers can carry a defense load without reducing their regular output; the degree of inflationary pressure; the success of voluntary cooperation; the extent to which politicians will refrain from exerting special-interest pressure on the departments—who have to continue to live with Congress; and the extent to which the public will continue to support a large defense program.

Changes will be made, no doubt, and the job of coordinating such a multilateral arrangement may prove insuperable, but only the future can tell if the present arrangement can be amended to meet new situations or will collapse in a welter of confusion as did the earlier World War II agencies.

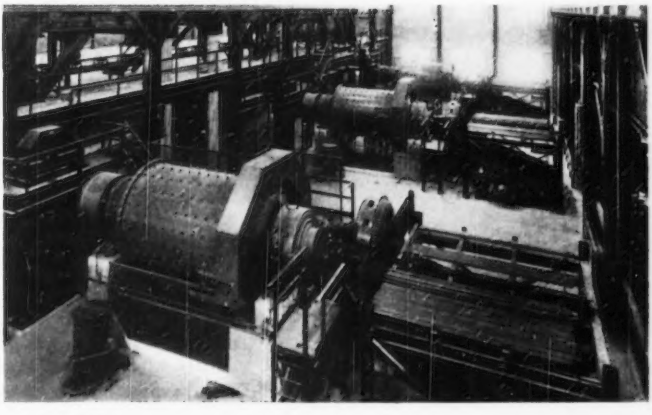


REPUBLIC STEEL CORP.'S Fisher Hill plant concentrates crushed ore from the Mineville properties. Mining in this area dates back to the Revolution. Republic ships lump ore and iron sinter from its Adirondack operations, which are unique in the region because of the low titanium and phosphorus content of the ores.

Adirondack Mining . . .

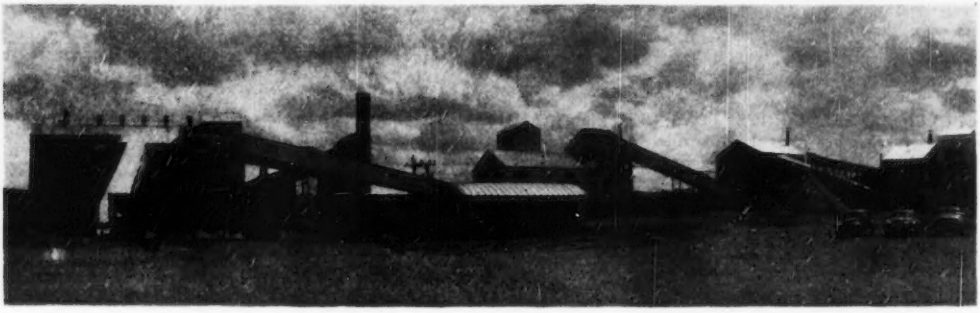
Is Diversified, Important, Accessible, and Has a Promising Outlook

VIEW OF REPUBLIC'S Lyon Mountain plant. At both the company's Adirondack divisions, extensive rehabilitation was undertaken when Republic took over. At both, the ore occurs in extensive flat seams, suggestive of sedimentary bedding. As with all Adirondack mining, the country rock is Pre-Cambrian, extensively deformed and metamorphosed.



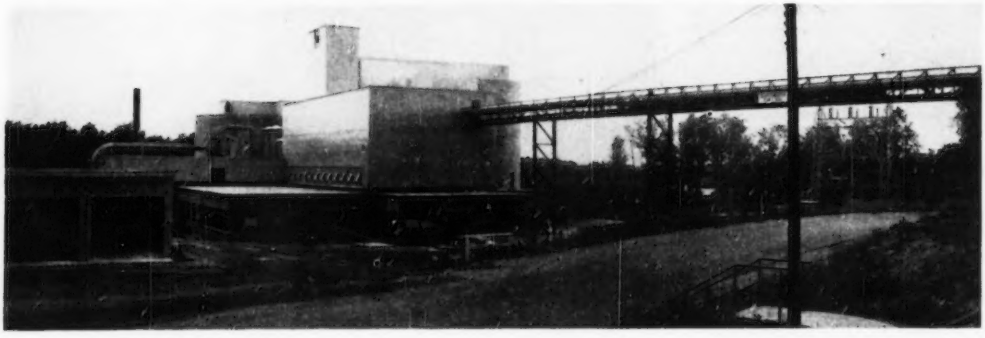
DESIGNED FOR EFFICIENCY—the grinding floor of the Fisher Hill plant, built during World War II, illustrates the ample room and the accessibility of all sections for repairs and to handling of machinery and supplies by overhead crane. Concentration is done by wet-belt magnetic separators, designed by R. J. Linney, manager of Republic's Adirondack operations.

AT TAHAWUS, the National Lead Co. is mining 5,000 tons per day of ilmenite-magnetite ore, the two minerals being separated magnetically after magnetic separation from gangue. The iron concentrate, as with most Adirondack iron output, is sintered before shipment. The pit overlooks beautiful McIntyre Lake.



UNDERGROUND MINING of a 40° dipping seam of magnetite is conducted by the M. A. Hanna Co.'s Clifton Mines Division near DeGrasse. Sub-level ring diamond drilling and scraper loading are employed. Production is 800 tons per day.

MINE OF GOUVERNEUR TALC CO. across road from mill. The area is the principal source of talc in the country. Other leading producers are International Talc Co. and Loomis Talc Co.



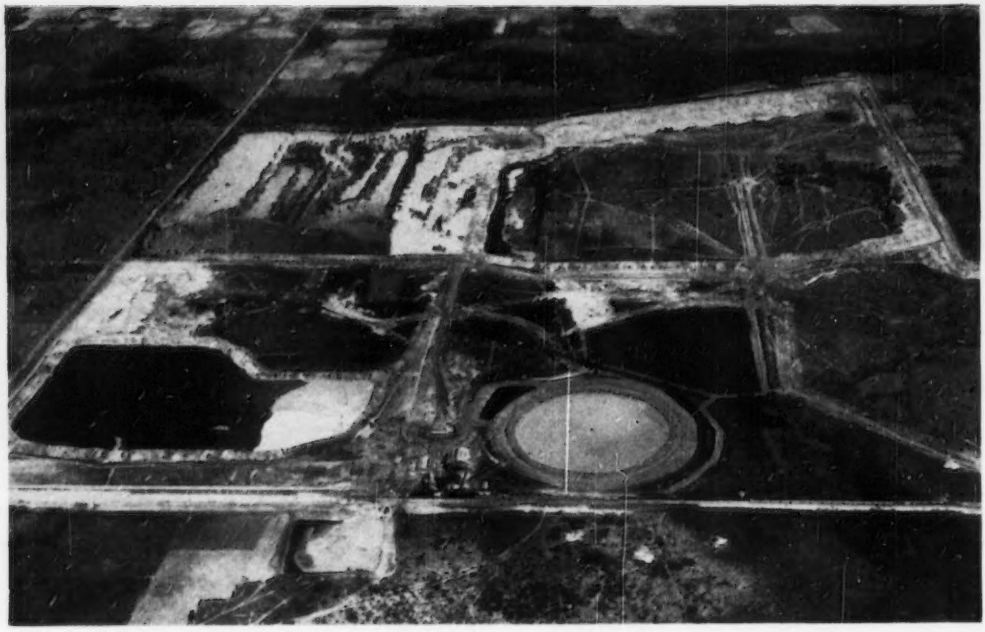
FLUID ENERGY MILLS (E&MJ., April, p. 102) are utilized for very fine grinding in this modern plant of Gouverneur Talc Co., a subsidiary of R. T. Vanderbilt Co. of New York. A number of grades are produced.

SUCCESSFUL PIONEERING in the mining of low-grade magnetite-martite ore has been accomplished at the large open pit of Jones and Laughlin's Benson Mines. Pit is two miles long. Present mill is magnetic, but a companion gravity plant using Humphrey's spirals is contemplated. Daily mining rate is 8,000-10,000 gross tons of ore.

PROPER SYNCHRONIZATION of drilling, blasting, loading and hauling at such an extensive pit of variable ores as Benson Mines presents management with a continuous problem. Above, shovel is idle while secondary blasting proceeds.

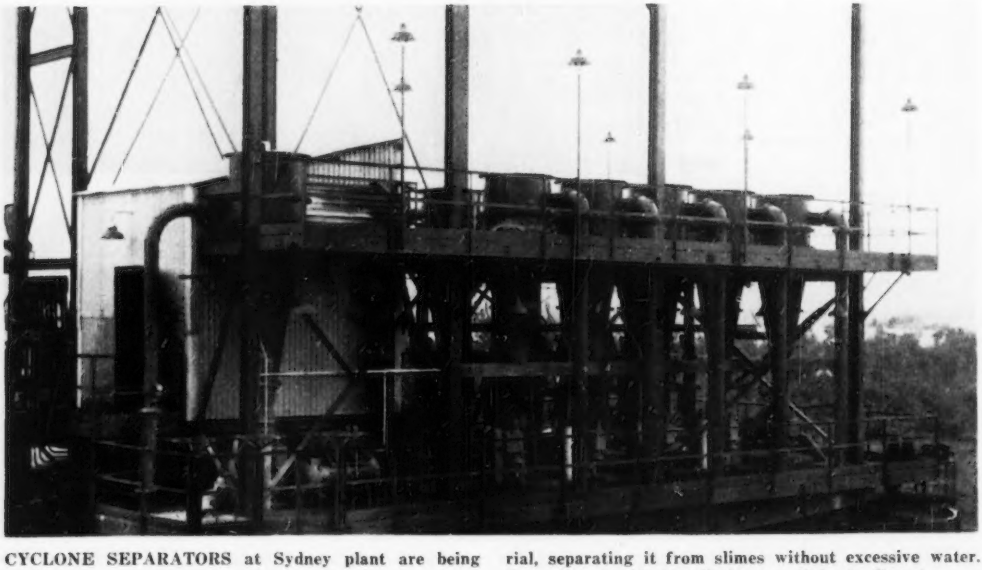
AT BALMAT, the St. Joseph Lead Co. is mining 1,200 tons per day of zinc-pyrite-lead ore and mines 400 tons at Edwards, ten miles away. A new shaft is being sunk to mine the hangingwall portion of the Balmat orebody. View is of the hoist house, headframe and crushing plant at Balmat. →

HEART OF GARNET WORLD—near North Creek the Barton Mines Corporation produces 90% of the garnets used by U. S. industry from th's open cut. Milling utilizes heavy media, jigging and flotation.



UTILITY LAND required for settling area, slime storage and water clarification has been held to minimum at Sydney mine by separating fine phosphate from slimes without using excessive water. In this view, looking east, the new plant is in center foreground. At right is 750-ft. thickener basin. Large pool at left is flotation tailing pond. Just beyond the pond, at left, is current mining area, and beyond that, in background, is slime settling area.

Three New Steps in Treating



CYCLONE SEPARATORS at Sydney plant are being used to recover plus 150-mesh phosphate-bearing material, separating it from slimes without excessive water. Separators in this installation are 48 in. in diameter.

SYDNEY PLANT from air, in a nearer view. Large building near center is the flotation plant where separation is made both in cells and on moving conveyor belts. Lower building to left is the washer. Nearer railroad track is feed preparation section. To right of this along track is reagent mixing house and "tank farm." In right background is 750-ft. thickener basin with its 300-ft. diameter mechanism. Along railroad track are the shipping bins.

Florida Phosphate Rock

These advances mark Sydney plant flowsheet

1. Outstanding is the separation of the large mud balls from the matrix slurry and reduction of their size without scrubbing the smaller particles.

2. Use of cyclones for desliming flotation feed is new and novel in Florida pebble field.

3. The large thickener area served by rakes covering less than half the thickener area is a novel and useful installation.

ARTHUR CRAGO
General Manager
American Cyanamid Co.
Brewster, Fla.

THE SYDNEY PROPERTY of American Cyanamid Co. is located 15 miles east of Tampa on State Highway 60. The tract contains about 2,500 acres. In December, 1949, a plant with a nominal yearly capacity of 500,000 tons of phosphate rock was put in operation on it. As Acco station, the plant is served by the Seaboard Air Line Railroad.

The phosphate deposits of the Florida pebble district are all somewhat similar, yet each has its own peculiarities. The peculiarities require certain modifications of the more or less standard ore-dressing practices of the district. In this paper I will deal with the peculiarities of the Sydney deposit and how the ore-dressing treatment was modified on account of them.

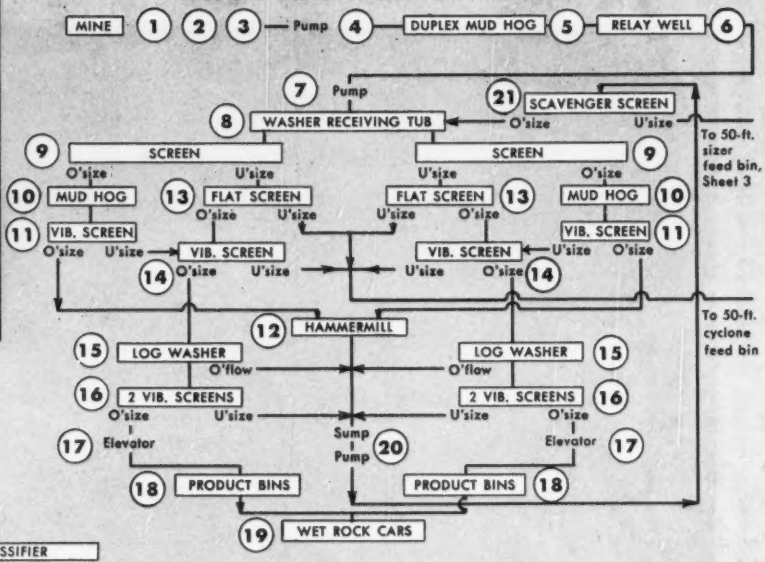
Phosphate matrix of the pebble district varies in depth from 4 to 25 ft. and consists of approximately one-third recoverable phosphate, one-third silica sand, and one-third clay slime. It is overlain by 6 to 40 ft. of a sandy overburden, to remove which a large dragline is used. After the overburden has been removed, the same machine then mines the matrix and deposits it at the suction of a sand pump situated at ground level within reach of the dragline. At this point the matrix is broken up and made into a slurry with high-pressure water (150 psi.). The slurry is picked up by the sand pump and transported to the washer.

In the washer, all clay balls are broken up and the slurry is screened so that the phosphate particles larger than the sand grains are removed from the remainder of the matrix. The screening is done usually on 14 or 20 mesh. This plus 14 or plus 20 mesh material is a finished wet rock product. The undersize from the washer screen-

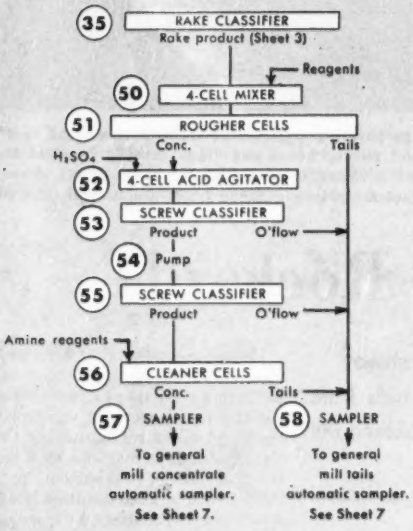
FLOWSHEET OF AMERICAN CYANAMID CO.'S WASHER AND FLOTATION PLANT, SYDNEY PHOSPHATE MINE, FLORIDA

NOTE The "sheets" numbered from 1 to 8 mentioned in this flowsheet refer to the eight sheets of the company's flowsheet which form the basis of this drawing.

SHEETS 1 and 2 MINE AND WASHER

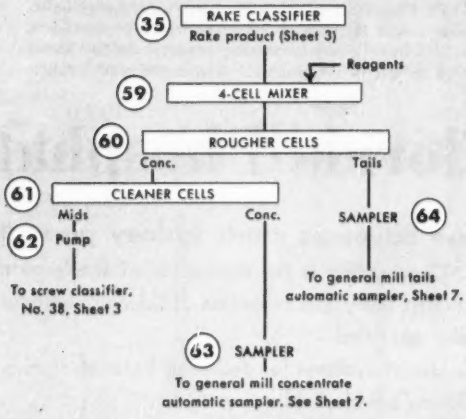


SHEET 5 CELL FLOTATION



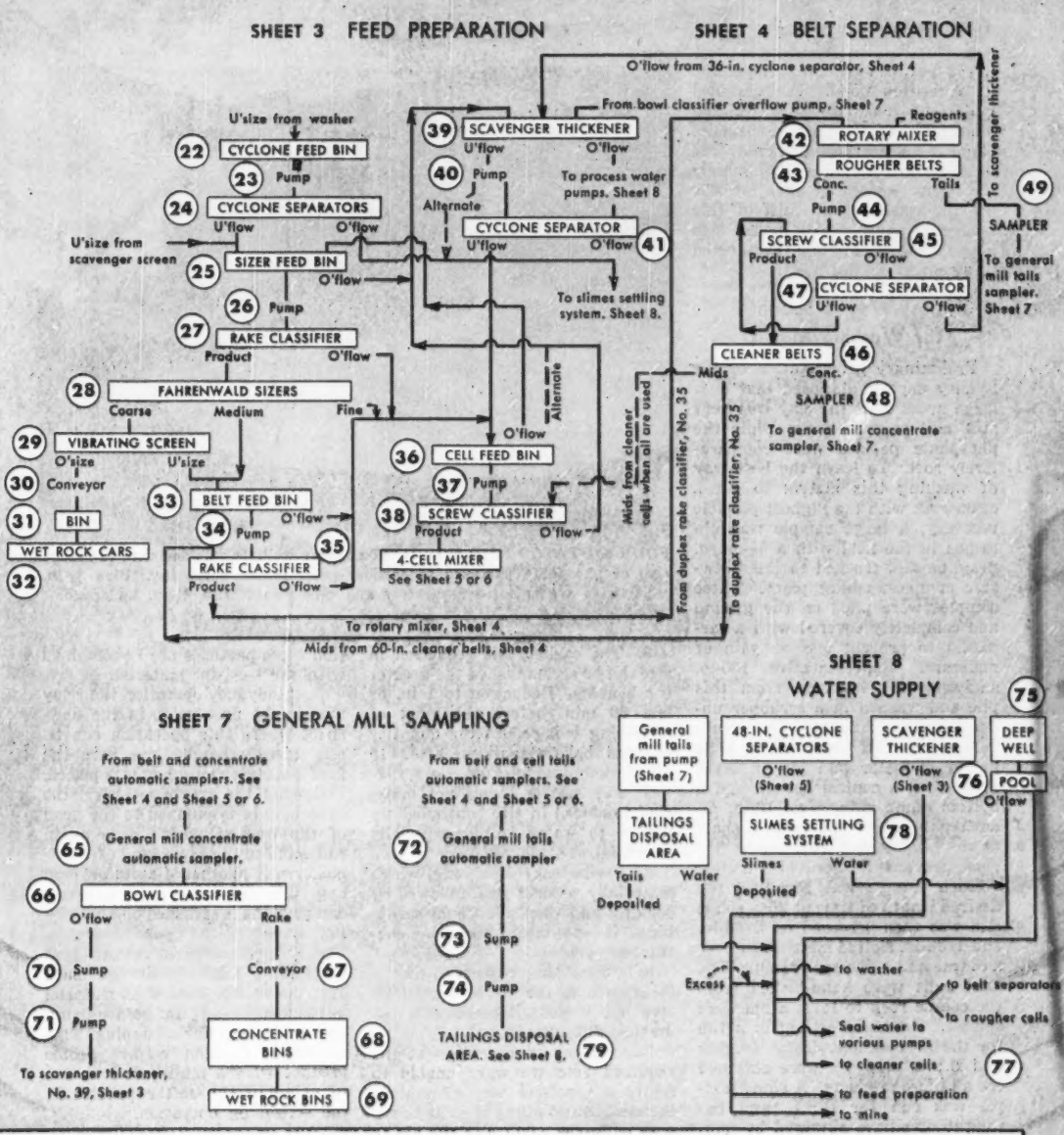
SHEET 6 CELL FLOTATION (Alternate)

(Use this sheet in place of Sheet 5 when amine reagents are not used on cleaner cells)



LEGEND

1. Prospect data obtained through spot drilling and laboratory analysis.
2. Overburden stripped with 650-B Bucyrus-Erie dragline, 175-ft. boom, 17-cu. yd. bucket.
3. Mining done with same equipment as in "2."
4. A 16-in. Georgia Iron Works pump, hydraulic guns.
5. Four-agitator unit mud hog. Plate screen with ¾-in. openings.
6. Identical to item 4.
7. Identical to item 4.
8. Tank with split discharge feeding duplex washer unit.
9. Flat plate screen, with ¾-in. openings.
10. Identical to item 5.
11. Allis-Chalmers low-head screen, 5x12-ft., ½-in. openings.
12. Dixie hammermill, No. 3620.
13. Same as item 9, 1/32-in. openings.
14. Same as item 11, 1/32-in. openings.
15. McLanahan-Stone log washer, 12 in. by 30 ft.
16. Same screen as in item 11, 1/32-in. openings.
17. Jeffrey belt bucket, 100 tons/hour.
18. Chicago Bridge & Iron, 22 ft. dia. by 18 ft. deep.
19. Seaboard Air Line, bottom-dump.
20. Sump, 8 by 20 ft. by 10 ft. deep, with 16-in. G.I.W. pump.
21. Flat plate screen, 1/32 by ½-in. openings.
22. Chicago Bridge & Iron, 50 ft. dia. by 15 ft. deep.
23. Separator feed pump, 16-in. G.I.W.; 500-hp. motor.
24. Ten cyclone separators, 48-in. dia.
25. Chicago Bridge & Iron, 50 ft. dia. by 25 ft. deep.
26. Sizer feed pump, 10-in. G.I.W., 150-hp.
27. Dorr duplex rake classifier, sizer feed.
28. Six Dorr Co. sizers.
29. Same as item 11, 4x10-ft., 1/32-in. openings.
30. Link-Belt Co., 18-in., sizer product.
31. Chicago Bridge & Iron, 22 ft. dia. by 18 ft. deep.
32. Seaboard Air Line, bottom-dump.
33. Chicago Bridge & Iron, 50 ft. dia. by 30 ft. deep.
34. Belt feed pump, 8-in. G.I.W., 50-hp.
35. Dorr classifier, belt feed.
36. Chicago Bridge & Iron, 50 ft. dia. by 27 ft. 6 in. deep.
37. Cell feed pump, identical to item 34.
38. Wemco 78-in. screw classifier, cell feed.



LEGEND

39. Thickener reservoir, 750 ft. in diameter. Dorr thickener 300 ft. dia., 1/60 rpm.
40. Cyclone feed pump, 8-in. G.I.W., thickener reclaim.
41. Cyclone separator, 48 in. dia.
42. Horizontal type, 6 ft. dia. by 20 ft. long.
43. Three conveyor belts, 42 in. wide, with rakes.
44. Rougher-belt concentrate pump, 10-in. G.I.W., 150-hp.
45. Wemco 54-in. screw classifier, cleaner belt feed.
46. Two conveyor belts, 60 in. wide, with rakes.
47. Cyclone separator, 36-in. dia.
48. Geary-Jennings automatic sampler.
49. Identical to item 48.
50. Cell feed conditioners, four-unit agitating-type mixers.
51. Rougher cells, 56-in. Fagergren. Three units.
52. Four-unit agitating mixer.
53. Wemco 60-in. screw classifier, acid rinse.
54. Minerals-Separation cleaner cells feed pump, 6-in. G.I.W.
55. Wemco 60-in. screw classifier, M.S. cleaner
56. Minerals Separation Air Flow, three two-cell units.
57. Identical to item 48.
58. Identical to item 48.
59. Identical to item 50.
60. Identical to item 51.
61. Identical to item 56.
62. Cell-middlings pump, 6-in. G.I.W., 30-hp.
63. Identical to item 48.
64. Identical to item 48.
65. Identical to item 48.
66. Dorr classifier, bowl, for concentrates.
67. Link-Belt Co., 24-in., concentrates.
68. Chicago Bridge & Iron, 22 ft. dia. by 18 ft. deep. Five units.
69. Identical to item 19.
70. Classifier overflow tank.
71. Classifier overflow pump, 12-in. Allis-Chalmers, 20-hp.
72. Identical to item 48.
73. Concrete sump, 12 by 12 by 10 ft. deep.
74. General mill-tailings pump, 16-in. G.I.W., 500-hp.
75. Deep well, 6000-gpm.
76. Reservoir.
77. Process pumps.
78. Mined-out areas.
79. Mined-out areas.

ing is deslimed and the slime stored in a settling pond. The deslimed material is put through a flotation plant where the fine phosphate value is concentrated and recovered in a concentrate of approximately the same grade as that of the coarser washer rock. All of this recovered pnosphate is loaded into hopper bottom cars and transported to a central drying plant.

Best Way Is Sought for Washing Matrix

Preliminary investigation of the Sydney deposit disclosed that over large areas of it the clay was very stiff and hard to wash while the phosphate pebbles were comparatively soft. To learn the best way of washing this matrix to get a clean rock with the highest possible recovery, a large sample was obtained in the field with a ¾-cu.yd. dragline and trucked to the Brewster sample-washing plant. These samples were piled on the ground and completely covered with a tarpaulin to prevent loss or gain of moisture. Representative 100-lb. samples were removed from this pile and washed in a scrubber under varying conditions. The scrubber consisted of a vertical tank 30 in. in diameter and 30 in. high, fitted with a conical bottom and a bottom dump gate. Two 12-in. diameter impellers on a vertical shaft at the tank center, rotating at 350 rpm., provided the scrubbing action.

Each sample was scrubbed the desired length of time at 20% solids and was then screened on 3/64-in. and 1/32-in. slotted metal to recover a coarse and a fine rock sample. The mud balls were hand-picked from the coarse rock to form a mud-ball sample. Feed was settled in a tub for the feed sample. Total weights and B.P.L. analyses were obtained for all these products. A slime sample was run for B.P.L. and the weight of slimes obtained by subtraction.

Tests were run on the matrix in its natural state and broken through a 1-in. screen with various soaking and scrubbing times. The soaking times were uniformly 0, 10, 20, or 30 min. and the scrubbing times 10, 14, 16, 18, or 20 min. The soaking time represents the delay in getting the material from the pit to the washer through wells and pipelines.

As a result of these tests we arrived at the following conclusions:

1. Reduction in the size of matrix lumps, as differentiated from scrubbing, will aid scrubbing.

FOUR-AGITATOR MUD-HOG UNIT at relay well. It was designed to reduce size of phosphate particles at earliest point to aid scrubbing. Plus ¾-in. particles are agitated separately and recombined with ¾-in. undersize.

2. The earlier this reduction in size can be accomplished the greater the benefits. Reduction to 1 in. or less 30 min. before the start of scrubbing will reduce the quantity of mud balls remaining after 15 min. scrubbing by 80%.

3. For matrix lumps not materially reduced in size continued exposure to water is not especially beneficial.

4. Preliminary scrubbing, which materially reduces size, followed by soaking and then additional scrubbing, is the most effective "continuous" process.

5. Piling damp matrix so that it is exposed to the air is very effective but presents considerable operating difficulties.

For continuous operation at the required rate we were unable to figure a practical way of mining the matrix and piling it so as to expose sufficient surface to the air to get any benefit from air drying. We were, therefore, compelled to concentrate on a reduction in size at the earliest possible point in the flowsheet.

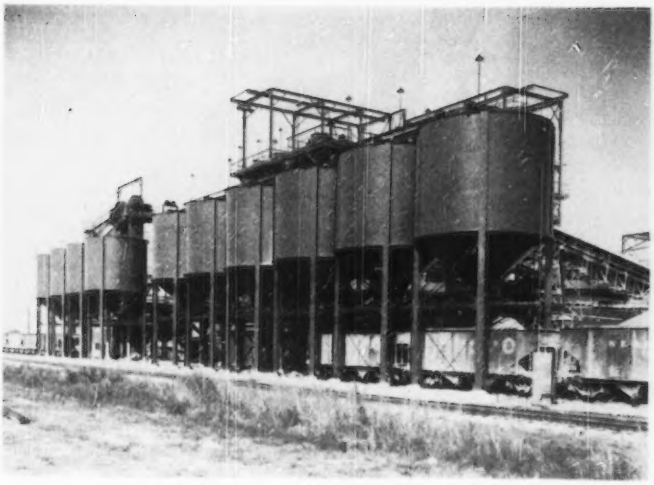
To accomplish this reduction in size of particles a "mud hog" was worked out. This machine consists of a punched metal screen with ¾-in. openings followed by four 28-in. cruciform impellers rotating at 230 rpm. and each powered by a 50-hp. motor.

In the operation of the mud hog the +¾-in. particles are separated from the smaller material and agitated by themselves. After agitation these particles are re-combined with the —¾-in. material.

In the Sydney operation the relay well is the first point in the flowsheet where this operation can be conveniently handled, so here the first 4-agitator mud hog was placed. Following the treatment here, the total matrix is pumped to the head of the washer, where it is again subjected to the same kind of treatment with another 4-agitator mud hog. The discharge from the second machine is screened on a vibrating screen with ½-in. openings. The +½-in. material is then sent through a hammermill and back over the washer so that all material is reduced to —½ in. before being sent to the logs for scrubbing. This results in a clean washer pebble product with a minimum loss due to grinding the softer pebbles in the scrubbing operation.

The Problem of Reducing Required Settling Area

In this district, the flotation feed is usually recovered from the washer waste by passing the waste through a hydroseparator where the +150 mesh material is settled and the —150 mesh material is overflowed to waste. This —150 mesh material containing the clay is settled in settling ponds and the clarified water recovered and reused in the mining and washing operation. Since the Sydney deposit is in an area of small intensely cultivated farms, utility land for set-



TRACK HOPPER BINS at Sydney plant from which wet finished phosphate rock in plant is loaded into hopper-bottom railroad cars for transportation to central drying plant. The bins are also shown on pages 78 and 79.

tling area, slime storage, and water clarification is difficult and expensive to purchase. During at least part of the life of the Sydney plant it would be necessary to pump the slime to the settling ponds. We, consequently, planned to thicken the slime from the hydroseparator overflow prior to sending this slime to the settling area. Tests on the Sydney deposit showed that, when mining at the rate of 400 cu. yd. per hour, 20,000 gpm. of dilution water would be needed for the hydroseparator in addition to approximately 20,000 gpm. entering from the previous mining and plant operation.

Thickener tests indicated that when mining at the rate of 400 cu. yd. per hour the hydroseparator overflow would require 22.7 acres of thickener area to clarify this water and thicken the slimes. This area required a minimum of nine 300-ft. diameter mechanisms.

Remedy Sought in Use of D.S.M. Cyclone

To avoid the necessity of installing this large amount of equipment and yet accomplish our purpose, a search was made for other means of recovering the +150 mesh material and separating it from the slimes without having to use this large amount of extra dilution water. The Dutch State Mines cyclone appeared to have possibilities. A small cyclone was constructed and tests were started to see what could be done with it. Preliminary tests with a 14-in. diameter cyclone gave a satisfactory recovery of +150 mesh material, with excellent rejection of slimes and no use of additional dilution water other than needed for mining and washing.

Capacity of this cyclone, however, was too low for the projected Sydney installation. Tests with a 48-in. diameter cyclone indicated that a satisfactory recovery could be made with a machine of this size and that the waste from the Sydney washer could be handled with six such machines.

By using these 48-in. cyclones to handle the washer waste in the Sydney operation, the —150 mesh material is rejected and sent to the slime-settling system without dilution except by the water required for mining and washing. Since they discard 75 to 80% of the slimes in a condition to be sent to the settling pond without passing through the thickener installation, it allowed us to reduce the size of the thickener installation very materially. As large amounts of water were still required for the rinsing, sizing, and classification, it was still necessary to put in a thickener installation to recover this water for re-use at the plant and still send only thickened slimes to the settling system.

To clarify this water for plant re-use, it was found, still required a large settling area. Since, in this case, the solids going to the thickener installation were very fine, it was decided to put one 300-ft. thickener mechanism in a 750-ft. diameter basin. Settling tests indicated that it would be very difficult to get more than 6% solids in the underflow when using a standard rake because of the character of the floccules and the very slow settling rate in the zone of compression. Tests with a picket-type rake indicated that the underflow solids could be increased from 6% to 14 or 16%. This picket-type mechanism did not hasten settling in the free-settling zone, but in the compression zone it seemed to break and compact the floccules to give an appreciably denser underflow. We felt safe in equipping the 750-ft. basin with a 300-ft. mechanism because we felt sure that any particles settling beyond the reach of the rakes would be extremely fine and settle to between 6 and 14% solids, taking a long time to go denser than 14% solids. We felt quite certain that before this settled slime would become dense enough to cause trouble it would move into the area kept raked down by the rakes. Picket type rakes were installed since it was quite an advantage to have the 14% solids in the underflow rather than the 6% solids we could get without them.

Success Realized

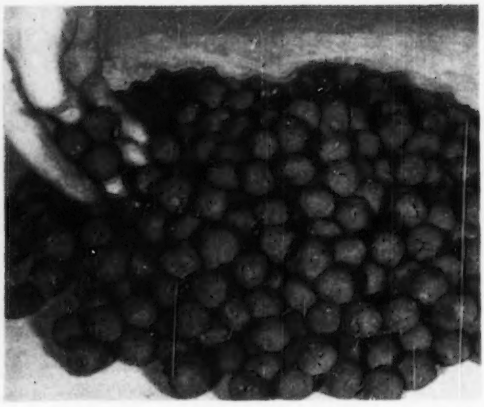
Judging from results to date, the principle of reducing the size of particles to less than 1 in. before the start of scrubbing has been very successful. We have been able to deliver clean rock from a matrix very difficult to wash with an extremely low loss of rock due to scrubbing.

On the cyclones, although we did a great deal of experimental work before their installation in the plant, we still regard these machines as experimental, as tests are being made to improve their operation even further.

The 750-ft. thickener, with the 300-ft. thickener mechanism and the picket-type rakes, has given satisfactory results. The overflow water has been quite clear, the underflow solids as indicated by test, and the slime that has settled beyond the end of the raking mechanism, we are quite sure, has moved into the raked area as expected. We base this assumption on the fact that we have no build-up at this point and at times the underflow carries for many hours considerably more solids than is currently being put into the thickener.

From taconite to pellets

MESABI MAGNETIC TACONITE—In this specimen, running 30% iron, the dark bands contain a little more than 30% and the light bands a little less.



THESE PELLETS of taconite concentrate contain 64% iron, dry, 8½% silica, and 0.035% phosphorus. Porosity of the individual pellets is 25-30%.

A Report on Taconite

A profit of 29c per gross ton of pellets delivered to Lower Lake Ports at current Lake Erie price is indicated by a recent cost study

E. W. DAVIS
Director
Mines Experiment Station
Minneapolis, Minn.

THE ENORMOUS DEMAND FOR STEEL during the past ten years—and now the possibility of a new world war—has brought great concern, even to the man on the street, regarding our ability to continue to produce the iron ore from which steel is made. The Lake Superior district has been a magnificent source of easy ore for the nation for 50 years. During that time, 2 billion tons has been shipped to the steel plants at an average rate during the past 10 years of nearly 80 million tons per year. The drain of production year after year at this high rate is beginning to tell—even upon the mighty Mesabi. However, long before this fact was apparent to the general public, the steel companies were quietly going about the business of taking care of the nation's future steel requirements. Their geologists and engineers have been scouring every corner of the western hemisphere and now are in a position to say that there is no cause for concern—there is plenty of iron ore. The only question is from which of several sources can they secure their future requirements at the lowest cost.

It is true that much of the new ore developed by the steel companies is in Canada and Labrador—foreign countries—and not under our immediate control. But the ore-producing subsidiaries and agents of the steel companies in the Lake Superior district have also developed a new source of ore right here at home that, in itself, is amply large to supply the total requirements of the nation for generations. This, of course, is taconite—the iron formation of the Mesabi, the

Cost of Taconite Pellets Delivered to Lower Lake Ports

	Cost per gross ton of pellets
Labor—1 man-hour per ton plus social security, vacations, etc.	$1.65
Power—70 kw.-hr. per ton—1c per kw.	0.70
Supplies, repairs, maintenance, etc.	1.90
Stocking and reclaiming pellets (winter storage)	0.25
Miscellaneous, including heat, insurance and contingencies	0.20
Total Operating Cost	$4.70
Taxes—All kinds	$0.20
Royalties—Mine	0.15
Depreciation and Interest—7½% x $20	1.50
Total Overhead	1.85
Total Cost, f.o.b. Mine	$6.55
Transportation to Lower Lake Ports, including shrinkage	2.69
Total cost delivered to Lower Lake Ports	9.24
Lake Erie price, 64% Fe (dry), 62.5% Fe Nat. x $0.15243	9.53
Profit per gross ton of 2240 lb.	$0.29

mother rock from which the great mines originated. This formation is repeated over and over again around the shores of Lake Superior in Minnesota, Michigan and Wisconsin. The district is running short of the kinds of iron minerals that have been shipped to the furnaces down the Lakes in the past, but it is certainly not short of iron minerals of other types.

Research and Pilot Plants

While the steel company engineers and geologists were studying the ore deposits in other areas, the Lake Superior mining companies were studying the taconite rocks that appeared around them on every side, trying to find a way to make good iron ore from them. Progress was slow at first, but as high demand for ore continued, one company after another established research laboratories and stepped up their investigations. What they were trying to do was to develop commercial methods by which high-grade iron ore could be manufactured from taconite to exact blast-furnace specifications. These specifications were for a high iron, low silica, low phosphorus, fast-reducing, dust-free product of high purity. This product had been produced in the form of taconite concentrate pellets in the laboratory at the Mines Experiment Station, but it is a long step from laboratory production of a few pounds a day to commercial production of hundreds of tons per hour. But this step is now being taken. Erie Mining Co., managed by Pickands, Mather & Co., is operating a pilot plant at Aurora, on the Mesabi, producing taconite pellets by the carload and shipping them to Duluth and on down the Lakes. It is true that this plant has a capacity of only a quarter of a million tons per year, but it has operated long enough to demonstrate without a shadow of a doubt that a very superior product can be made from taconite, tailor-made for blast-furnace smelting. Reserve Mining Co., managed by Oglebay, Norton & Co., also has a plant in operation producing pellets, and the Oliver Iron Mining Co., subsidiary of U. S. Steel, is now in the process of building a pilot taconite plant at Virginia, also on the Mesabi, that will have a capacity of almost a half million tons per year.

As it now stands, it is simply a question of where they choose to get their future ore. Each company is answering this in its own way, inasmuch as some must have new ore before others. Announcements have been made by some companies indicating their future programs. U. S. Steel and Bethlehem will get their supply from taconite and from Venezuela. Republic will get theirs from taconite, Venezuela, Labrador and Liberia. National Steel will get its ore from Labrador, but its chief supplier in the Lake Superior district, the M. A. Hanna Co., has been acquiring large areas of taconite land. Youngstown and Armco will get their ore from taconite and Labrador. Wheeling Steel now appears to be interested only in Labrador, but the Inland company is interested in both directions. The U. S. Steel taconite operations are under the Oliver company. Bethlehem and Youngstown together form the Erie Mining Co., with Pickands, Mather & Co. as its operating agents. Armco and Republic together form Reserve Mining Co. with Oglebay, Norton & Co. operating agents.

Big Money Required

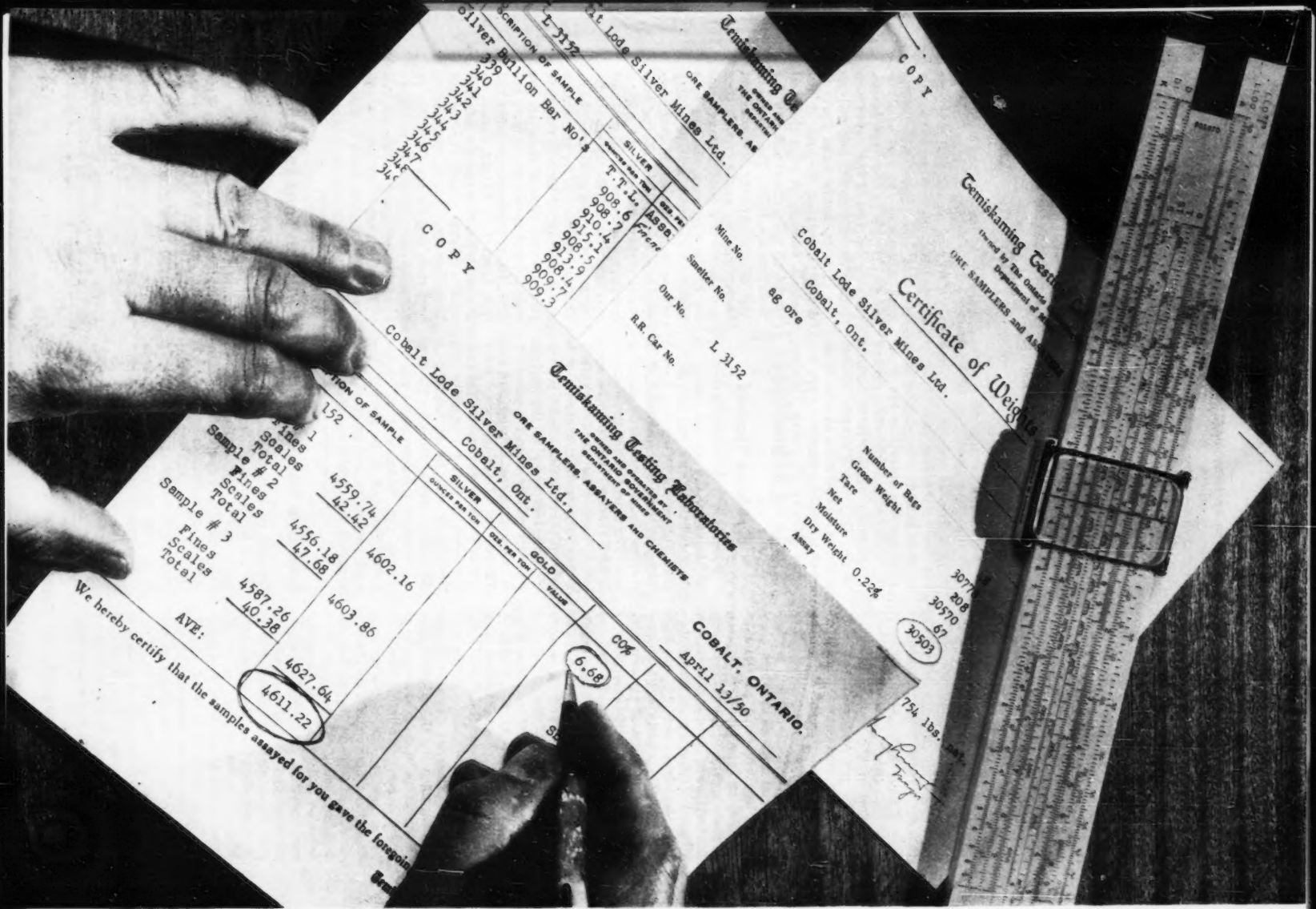
From this it is evident that most of the companies do not intend to depend entirely upon one source for their future ore. They will have a domestic source—taconite—and a foreign source of direct-shipping ore. The extent of the development in both areas will depend upon costs which cannot be definitely determined until production starts. It is evident that the investment per ton of annual capacity in the various districts will be almost a stand-off. It is going to cost between $15 and $20 per ton of annual capacity for any of these developments. The only difference is that for taconite this investment will be principally in processing plants, while for the foreign sources the investment will be largely for transportation equipment. However it be figured, the steel companies are going to have to invest over a billion dollars during the next 10 or 20 years to provide themselves with another 50-year supply of ore. This is not very different from the investment that has been made in mining and transportation equipment to bring the Lake Superior ores to the steel plants. In the future, the cost of production will be higher and much of the easy flexibility of the great Mesabi open-pit mines will be a thing of the past.

The Cost of Production

Good estimates indicating the costs of bringing foreign ores to our furnaces are not available. One study that has been made recently indicates that they can compete with taconite as far west as Pittsburgh. If this is true, the accompanying estimate of the cost of producing taconite pellets and delivering them to Lower Lake Ports is doubly important because it becomes a measure of what the steel plants of the future will pay for their iron-ore units. The figures in this estimate are the best that can be put together at the present time and represent a good average opinion of the engineers who are in a position to know. Taconite milling will be quite similar in many respects to the milling of the low-grade copper ores and the mining company engineers have swarmed over the west and southwest studying modern copper milling methods. This cost estimate is for the mining and processing of Mesabi magnetic taconite—the type of material the steel companies are planning to use first. Other types are available, but this appears to be the easiest to process. There is plenty of this type, a 50-year supply for the big 10-million ton plants now being projected, and by the time this is gone, another group of metallurgists, engineers and technicians will certainly have developed methods to use other types that exist in almost endless quantity.

Iron Ore Imports under 4½ Million Tons to Aug. 1.

IMPORTS OF IRON ORE for consumption in the United States in 1950 up to the end of July totaled 4,358,566 gross tons. Ore containing 10% or more of manganese is not included. Chile led the countries of origin with 1,515,496 gross tons, followed by Sweden with 1,237,425. Canada and Newfoundland occupied third place with 673,379 gross tons. Algeria, fourth on the list, and Brazil, fifth, yielded almost the same quantity, with 294,744 tons and 293,817 tons respectively. Mexico, sixth, shipped 107,151 gross tons. Of the remaining countries, British West Africa shipped 80,485 gross tons, Tunisia 79,694, Spanish Africa 39,680 and Cuba 23,000 tons. Norway sent 9,860 gross tons. France 500 and United Kingdom 335 tons. Liberia is credited with less than 1 ton. These figures are supplied by the U. S. Bureau of Mines.


COPY
Temiskaming Testing Laboratories
ORE SAMPLERS, ASSAYERS AND CHEMISTS
Certificate of Weights
Cobalt Lode Silver Mines Ltd.
Cobalt, Ont.
Mine No.
Smelter No.
Our No.
R.R. Car No.
L 3152
Number of Bags
Gross Weight
Tare
Net
Moisture
Dry Weight
Assay
COBALT, ONTARIO.
April 13/50
754 lbs. Net.
Silver Bullion Bar No's
339
340
341
342
343
344
345
346
347
348
T.T.L.
908.6
908.7
910.4
915.1
908.5
913.9
908.4
909.7
909.3
SILVER
OUNCES PER TON
GOLD
OZS. PER TON
VALUE
Sample # 1
Fines
Scales
Total
Sample # 2
Fines
Scales
Total
Sample # 3
Fines
Scales
Total
AVE:
4559.74
42.42
4556.18
47.68
4587.26
40.38
4602.16
4603.86
4627.64
4611.22
6.68
60%
We hereby certify that the samples assayed for you gave the foregoin

Cobalt Camp Comes Back

High-grade silver ore, and values in cobalt indicate why the famous old camp is reviving

G. P. LUTJEN
Associate Editor

ONE OF THE WORLD'S most fabulous mining camps is back in business! Cobalt, Ontario, where for 18 years the ore mined averaged more than 1,000 oz. of silver per ton; Cobalt, whose silver production between 1904 and 1922 is topped only by three camps (all with more than 300 years' production); Cobalt, where a generation of mining men learned their trade and used their knowledge to bring in mines throughout Canada, is about to add another chapter to its remarkable history. A ghost camp has come to life.

Present activity in Cobalt, centered a few miles south of the main part of the old camp, has all the proportions of a major strike. Several million ounces of silver have been blocked out. While there hasn't been another "silver sidewalk," which ran almost solid native silver for a distance of 100 ft., to a depth of 60 ft. at the old La Rose mine, still many sections of the new orebodies are with many areas as rich as some of the incredible veins that made the camp famous 40 years ago. And beyond this, today's camp will be able to take advantage of its rich cobalt ore, which was profitless to the old operators. In the present jet engine, radioactivity-conscious world, cobalt metal commands an ever increasing respect and, what is more to the point, a steadily rising price.

Two interesting factors have influenced the camp's resurgence. First, time has made possible a happy combination of youth and experience. There is a core of practical, aggressive Cobalters who helped build the old camp and know its geology like the back of their hands. They have been joined by enthusiastic younger men, some born and raised in Cobalt, who are contributing experience and ideas from other camps and other countries.

It augurs well for New Cobalt's future that present operators can look at their orebodies in a different light than their predecessors. Where the old Cobalter, limited by equipment, had to concentrate on the high grade, today's operators are thinking in terms of mining mill rock, carrying as little as 10 oz. of silver per ton. There's still plenty of excitement when the last round discloses ore running 4,000 oz. per ton, but 40 years of mining practice since the heyday of the early camp has brought about a different concept of what makes a mine. "Sure, there's lots of quick money in mining the high grade," Cobalt men say, "but in the long run we'll be better off taking the lean with the rich. We'll get greater recovery that way. If you mine just the high grade, it costs too much to go back later for the low grade."

It is interesting to note that while the first two mines in production, the Silver Miller and the Cobalt Lode, have adopted this sound policy, mining high-grade silver in the early stages of development has permitted them both to be "pay as you go" mines. Fundamentally, however, the long view predominates, which will add to the ultimate life and production of the new mines.

A second factor in Cobalt's comeback is that despite the nature of the orebodies, which makes it almost impossible to block out the ore solely on the basis of diamond drill cores, exploration costs are reasonable. Diamond drilling, a great deal of which is being done, can do little more than indicate favorable conditions for ore deposition. When such conditions are revealed, there is no substitute for going underground and crosscutting over to take a look. Almost every miner in the place can show you where a

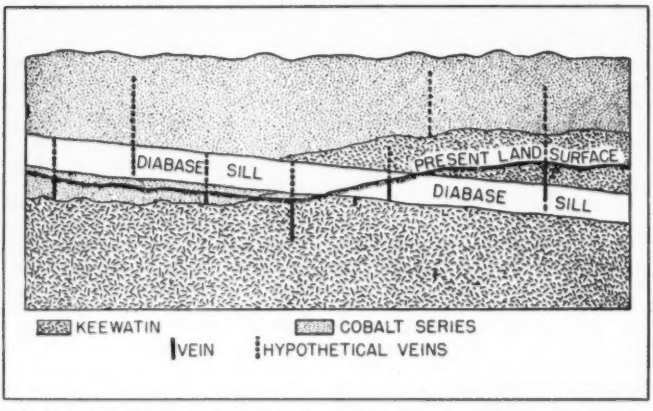
The Silver Miller led the way

140,000-OZ. OUTPUT monthly comes half from the mill, formerly a substation, and half from rich veins (right), hand-picked and shipped directly to the smelter.

The Cobalt Lode pays as it goes

MINE SUPT. Mario de Bastiani has done a fine job bringing the "Lode" into production.

RICH SILVER ORE like this awaiting shipment at top of winze on the 400 level, paid a good part of mine costs.



90% OF THE RICH VEINS in the old mines were at the Cobalt series-diabase lower contact. New mines produce from upper contact and Keewatin.

core has indicated a vein to be barren, only to have subsequent underground work find the vein rich in silver. Deposition is irregular and diamond drill holes can easily miss the metal.

Underground exploration is not excessively expensive because orebodies are relatively shallow, no compressed air plant is required, and because at most of the current properties shafts had previously been sunk.

Compressed air is supplied at nominal cost by the Hound's Chute plant. Here's how it works: A part of the flow of the Montreal river is diverted to a chute driven down through solid rock. The falling water traps air which is carried through a tunnel to a point where a stope-like dome has been blasted

Cobalt Chemical & Refining Co.'s smelter

NEARBY SMELTER to treat silver, cobalt and other metals was partially destroyed by fire before production was established. Owners plan rehabilitation.

Silanco Mining &

BUSY MAN is manager A. D. Hellens in charge of operations.

OLD STAMPS in newly bought mill, will pulverize ore for double tabling and flotation.

TRAMMER operates on compressed air. Unit will haul a train of 4 one-ton cars up to 1,000 ft. on one tankful of air.

out. The air escapes to the receiver and what is needed by the mines is tapped off by a large feeder pipe which individual mines can tap at a convenient point. The water flows on through the tunnel and back into the river. Excess air at the dome is released to atmosphere through a safety valve set at the desired pressure. The system, supervised by only one man, furnishes clean, dry air at a very low cost.

Shafts of the new properties, sunk for previous prospecting work, have proved adequate after some reconditioning. Why these shafts and their underground workings never developed into mines is one of the key points in the story.

Men who sunk these shafts did hit some high-grade silver and several orebodies now being prospected have production records. These operations, however, left untouched orebodies, which now rival some of the best that existed in the old camp. They missed these partly because the rapidly declining price of silver discouraged further prospecting that in all probability would have brought them into the rich ore, and partly because previous geologic findings in the camp played them false. To clarify this point, let's take a brief look at the geology of the area.

Basic volcanic rocks, greenstones and schist, known as the Keewatin series, are the oldest rocks in the area. Conglomerate and graywacke (arkose sandstone) were then deposited on the eroded Keewatin. Later, diabase sills up to 1,000 ft. thick intruded through the earlier formations (see section page 88).

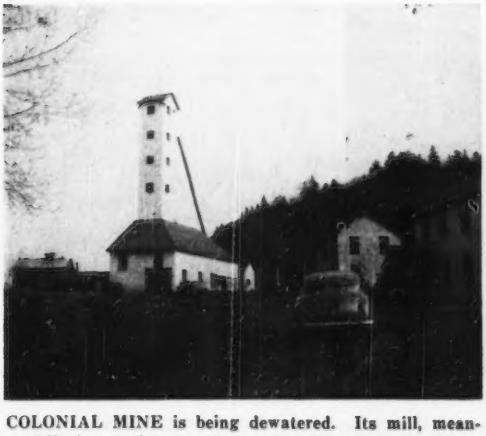
Fractures probably caused by faulting and fracturing of the diabase were filled by the veins and a series of major faults with minor faults running perpendicular to them had considerable influence on the flow of ore solutions.

Deposits are fault fissure veins 4 to 5 in. wide, a few hundred feet long and usually less than 300 ft. deep. About 100 veins were known in the old camp. A couple of dozen have been found in the new.

An unusual group of minerals constitutes the ore.[1] Calcite or dolomite makes up the gangue but is not always present. Native silver is the chief ore mineral, but dyscasite, argentite, stromeyerite,

[1] A. M. Bateman, "Economic Mineral Deposits," John Wiley & Sons, Inc.

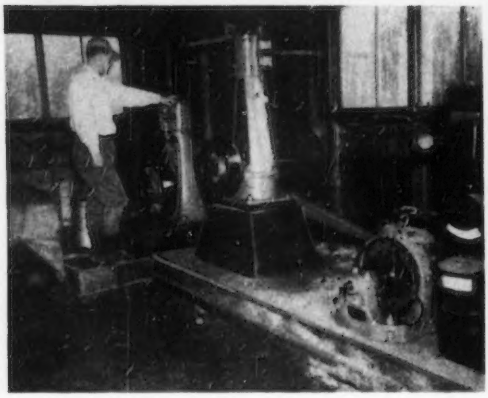
Refining Co. has the most properties



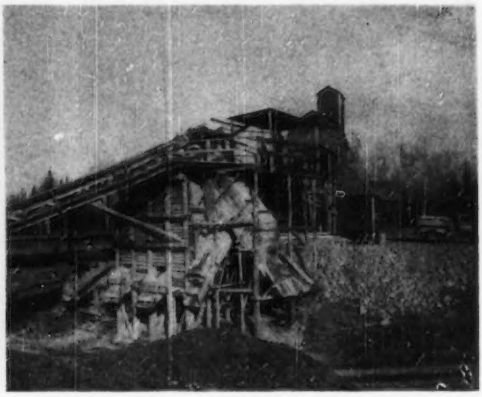
COLONIAL MINE is being dewatered. Its mill, meanwhile is treating ore from other Silanco properties.

1,000,000 TONS of tailings in Cobalt Lake from old camp will yield 4 oz. silver per ton for the Silanco company.

Mayfair Mines has large holdings in the new area



GENERATOR PLANT, powered by air motor, supplies power for lighting surface plant, recharging batteries.



TROMMEL SCREEN on top deck furnishes 6 grades of stone from waste development rock to be sold locally.

polybasite, stephanite and ruby silver are sometimes found, too. Bismuth, galena, pyrite, chalcopyrite, pyrrhotite and sphalerite are known, and arsenopyrite is abundant. The striking feature of the mineralogy is the unique group of nickel and cobalt arsenides. Deposits of cobalt minerals run as high as 9 and 10%.

Practically all the productive veins in the old camp were found in the conglomerate beneath the sill. Many mining men working in the camp consequently adopted as a rule of thumb that the only practical place to look for ore was in the conglomerate at the lower contact of the diabase. What exploration they did in the present producing area was directed on this premise. But now present operators have found that the upper contact of the diabase sill is also a fruitful hunting ground in the search for ore. Veins have been found extending about 500 ft. into the diabase and up 300 ft. into the Keewatin. And the lower contact is also indicated to have veins extending 300 ft. up and down from the contact.

When operations at Cobalt came to a halt shortly after 1922, there were mining men in the camp who weren't satisfied with the general opinion that all the silver had been mined. They explored and prospected and made steady attempts to interest backers who could furnish money for the necessary exploration. One of these men was Harry Miller.

Harry Miller had spent 40 years in Cobalt. Neither engineer nor prospector by training, what he knows about silver mining he learned through practical experience. Through the years of relative inactivity at Cobalt, he remained stubborn in his refusal to believe the camp was exhausted. On the basis of his somewhat unorthodox geologic theories, he made some shrewd deductions and pinned his hopes on Brady Lake. That small body of water, about 3 miles south of the town of Cobalt, is underlain by a fault. Harry Miller was willing to bet he would find high-grade silver there.

He bought several claims in the area. People scoffed, but Harry Miller persisted, and finally he got financial support from Toronto. From the shaft on one of his claims he started a crosscut toward the center of the lake. There were some dark hours, but when the fault was reached, there was the high-grade ore, as pretty as a picture. The Silver Miller became a mine and the Cobalt camp awoke. To Harry Miller must go much credit for Cobalt's revival, but many others too numerous to mention here, contributed, too.

Even a casual tour of the camp impresses the visitor with the amount of activity.

The Silver Miller, first of the Cobalt mines to get into production, has produced more than 2 million ounces of silver since operations began in January, 1947. The mine has just finished sinking its No. 4 shaft from the main production level at 440 ft. to 560 ft. It is now

The Silver Banner has completed diamond drilling

RACKED DRILL CORES represent about 5,000 ft. of diamond drilling on the 40-acre property.

TIMBER is for new headframe being constructed on the strength of results from drilling program.

Aussic Mining & Reduction Co.

AUSSIC MILL on Cross Lake will soon be treating 50 tons of ore daily from the nearby O'Shaughnessy lease.

The Christopher holds 60 acres

MINERS HAVE CUT the Cobalt Lode vein and are drifting in cobalt ore with good silver values.

engaged in sinking to the 600 level.

Sections of high-grade ore (some run as high as 10,000 oz. per ton) extend from above the 285-ft. level to 500-ft. level and perhaps deeper. The vein varies from 3 to 36 in. in width, but silver disseminated in the wall rock gives a width of 8 to 9 ft. of mineable rock.

Located in an old brick powerhouse, the mill, which started up in October, 1949, handles 50 tons of ore per day. A 12x20-in. jaw crusher and a small type "R" Allis-Chalmers reduction crusher yield a $-\frac{3}{8}$-in. product which a Marcy mill grinds exceedingly fine. Mill Superintendent Halstead reports that an extremely fine grind improves recovery of ruby silver, which is found in quantity in the ore.

High-grade ore, cobbed at the conveyor belt coming from the jaw crusher, accounts for about 70,000 oz. of silver a month, or roughly half the mine's production. The mill produces jig and table concentrates and a flotation concentrate. An increase in mill capacity may have to be made shortly.

The Cobalt Lode has just placed its recently purchased mill in production. The mill started out handling 50 tons a day, but capacity can easily be increased to 250 tons. While a standard jaw crusher will be the primary crushing unit, grinding will be done with the battery of stamps included with the purchase of the mill. In concentrating, double tabling will be employed and a flotation concentrate will also be recovered. About $25,000 was paid to Silanco Mining & Refining Co. for its old 104 mill and another $65,000 was spent to recondition it. Repairs and new installations were made by the mill crew rather than mechanics. This slowed rehabilitation somewhat, but the management now has a crew that is thoroughly familiar with the mill.

While the property adjoins that of the Silver Miller, the Cobalt Lode has not yet done any work on the Silver Miller vein. Miners have handpicked, bagged and shipped some 300,000 oz. of silver from the mines from high-grade producing vein (see p. 86).

Silanco Mining & Refining Co. is presently milling 100 tons per day of silver-cobalt ores with an estimated production of 45,000 oz. of silver per month; cobalt content, 5,000 lbs. Three mines are in operation; the Beaver and Temiskaming from where the current production is being drawn. Development here is proceeding with favorable results from the viewpoint of milling ore. The mill at the company's Colonial mine treats all the ore. The company's Auguanico mine is producing cobalt.

Mayfair Mines has the only inclined haulageway in the camp. When diamond drilling indicated a cobalt vein some distance from the shaft at a depth of 350 ft. and high-grade silver further from the shaft at the 500-ft. depth, an inclined haulageway was estimated to be more economical than sinking a vertical shaft and crosscutting on two levels. Costs have been $38 per ft., as compared with $100 per ft. for a vertical shaft.

Disposal of waste rock has been converted into an asset at this property. By placing a trommel screen over the dump, the mine can supply six grades of stone for sale to local purchasers in town.

South Giroux Mines is carrying on a systematic diamond drilling campaign on this large property which lies immediately west of the Silver Miller Mines. The program is under the direction of H. E. Cauley of Haileybury.

Development is proceeding at **O'Shaughnessy Lease**—O'Brien-Reinhardt Properties—with some production being achieved from the development headings.

At **Mensilvo Mines** a 25-ton per day concentrator is currently working, producing 1 ton of concentrates per day, averaging 14% cobalt content. The vein is strong and appears to hold good exploration possibilities.

Brady Cross Lake is now carrying on diamond drilling.

Other developments are shown in accompanying illustrations.

For the present, operators are turning their backs on cobalt metal. They feel that 80 to 85c. per pound is too low a price to mine it profitably, and look for a rise in price shortly.

Cobalt & Chemical Refinery Co., Ltd., offers a solution to the cobalt problem if and when they can get their smelter into production. A fire, destroying part of the plant, halted preliminary operations and some phases of their complicated metallurgical process remain to be worked out. Still there is a widely expressed need for the smelter and it may yet play an important role at Cobalt.

Come what may, with a backbone of high-grade silver plus important reserves in cobalt ore, Cobalters just naturally smile when they talk about the future.

WIDE PEGMATITE DIKES, several thousand feet long cut across this part of Gunnison County, Colo., near Ohio City. Mica mill for recovery of scrap mica is shown in foreground. See detail of mill on next page.

Colorado Pegmatite Deposit Yields Beryl and Mica

White gashes on the mountainsides bordering Willow Creek in Gunnison County, Colo., mark the workings of pegmatite miners. The author presents a firsthand account of what goes on at these interesting mineral deposits bearing beryl, mica, feldspar, columbite, samarskite and other rare earth minerals.

CHARLES A. WEMLINGER
Vice-president in Charge of Operations
Beryllium Mining Co., Inc.
Gunnison, Colo.

OPEN-PIT OPERATIONS of the Beryllium Mining Co., Inc., are situated on Willow Creek in the Gold Brick mining district of Gunnison County, 21 miles east of Gunnison, and approximately 1 mile from Ohio City.

Ore is extracted from a pegmatite formation approximately 4,000 ft. long and 2,500 ft. wide, which is composed mainly of graphic granite and quartz albite. At present neither of these minerals is being mined except where necessary to gain access to the pods or cores of more important minerals. These minerals, listed in order of importance, are: potash feldspar, scrap mica, beryl, columbite-tantalite, monazite, and samarskite. Minor amounts of other minerals have also been found. The upper part of the dike rises to an elevation of almost 9,700 ft.

All mining is done by open-pit methods. After each blast, the loose material is examined for any of the important minerals such as large books of mica, beryl, etc. Wherever possible these minerals are mined directly from the working face before blasting is done to prevent shattering by blasting. Mining from the face is done almost entirely by hand. However, sometimes a shallow hole is drilled close to a beryl crystal and ¼ to ½ stick of dynamite used to dislodge the crystal from the surrounding quartz.

While drilling is being done, the chips from the drill are examined closely for any signs of beryl to prevent shooting a charge too close to a crystal or within a crystal. After loose material has been sorted, it is bulldozed to the stockpile, from where it will be run through the mill for additional mica recovery. Any loose material that is barren of mica is bulldozed to one side into a dump.

Beryl crystals, probably due to their order of crystallization from solutions, appear to be full of minute cracks, and are readily broken into many small pieces if roughly handled. The bull quartz will withstand severe abuse, but beryl will break into pieces if caught by the bulldozer blade. The same is true of rare earth minerals, and consequently their recovery is

MICA-BEARING ORE is cascaded over crusher rolls and screens in series. 90 to 95% of mica is recovered as scrap mica.

BERYL CRYSTAL pointed out by R. Riddle of the operating staff.

OPEN-CUT MINE in pegmatite yields mica, beryl, feldspar and other minerals. Bulldozer in foreground loads trucks with ore.

FELDSPAR CRYSTAL BOUNDARY shows up clearly in exposed wall of open-cut operations.

BOOK OF MICA is being carefully removed by worker. Much of the mining is hand work.

rather slow. Although some of the mica crumbles when touched, most of it is very flexible. Those pieces which are too small to be recovered by hand sorting can be recovered for the most part by the mill.

How the Mica Mill Works

Material from the stockpile is hauled by truck to an ore bin above the mill. Here a grizzly removes all of the oversize before it enters the bin. From the bin the material goes into a jaw crusher where larger pieces are broken down, and the imbedded mica freed from the quartz or feldspar. Crushed ore moves over a shaker screen which removes all of the minus 6-mesh fines. Plus 6-mesh material goes on to a roll crusher.

Before this product enters the rolls, however, any plus 3-in. slabs of mica are removed. The rolls reduce all other material to minus $\frac{5}{8}$-in. Then the cycle is repeated, and minus 6-mesh fines are removed, and the plus $\frac{5}{8}$-in. mica is recovered. Minus $\frac{5}{8}$-in. plus 6-mesh

material moves on to a second set of rolls where it is further reduced to ⅜-in. The final roll reduces the material to minus 6-mesh. All of the mica recovered from the screens is fed into a storage bin, and minus 6-mesh fines are stockpiled. Probably 90 to 95% of the mica is recovered as scrap mica by this method, the balance going through the fine screens. The mica mill shown above is being rebuilt to handle larger capacity and to improve recovery.

Marketing of Minerals

In the past, pegmatite dikes were often mined for just one mineral and then abandoned after that mineral became exhausted. Sometimes dikes like these were shut down and reopened several years later to be mined for an entirely different mineral. In recent years, the trend has been toward the recovery of as many commercial minerals at one time as possible. Much of the value of pegmatite minerals depends on the location of the operation with respect to a standard-gage railroad loading point. Consequently many pegmatite operations have been abandoned because low-value minerals such as feldspar could not be mined and shipped profitably.

In order to get at the rarer and more profitable minerals, considerable tonnages of dike material have to be moved, and the more of this tonnage which can be sold, the more profitable the operation. If a small pegmatite mine operator can mine enough mica and feldspar to carry the costs of operation, he can usually store his beryl and rare earths until he accumulated a good tonnage. However, most operators have to sell the beryl as fast as it is mined to stay in business. Consequently they do not get the higher prices that carload lots of beryl command.

Feldspar in a crude state does not bring a very high price, and unless it can be shipped to a nearby market at a low cost, it certainly cannot be counted on as a revenue producer. Even stockpiling of feldspar is costly and of questionable value despite the excellent quality of the mineral available.

A recent development at this property has been the opening of a new beryl deposit lower on the mountainside than that shown on p. 92. Here the beryl is much cleaner and harder than that found in the upper dike, where weathering has apparently taken its toll. Thus far, the new deposit has yielded about 15 tons of beryl.

Sag vs. Belt Length in V-Belt Drives

F. H. RUMBLE
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.

NEWLY INSTALLED SETS of V-belts that sag—some more noticeably than others—often cause the plant engineer to ask, "Will pulling the sagging belts tight overstretch the others?"

Actually, a sagging belt is no cause for anxiety. Too often the relation between sag and belt length is misunderstood. This leads to an exaggerated idea of the difference in length between V-belts on a multiple-belt drive.

To clarify this situation, it should be pointed out that measurements of V-belts are made on grooved sheaves in motion under normal operating tension. Each belt is stamped with an inspection number, following the name brand. This number represents the plus or minus tolerance of the belt which has undergone the measurement and inspection.

Let us say, for example, that 50 has been selected as the base number. Then, belts stamped with numbers below 50 are minus tolerances; those identified with numbers over 50 are plus tolerances. Each number represents a difference of 1/10 in. The maximum length of difference allowed between shortest and longest belt in a matched set is only 1/10 in. per 100 in., or 1/10 of 1%. Consequently, stretching the shortest belt of a set this small amount will not harm it.

In considering the length between the tangent points of the sheaves on a drive, the accompanying table gives the differential in length between a belt which is tight and one which sags on the same drive. Values listed are for 180-deg. arc of contact on both sheaves and would vary slightly for other ratios.

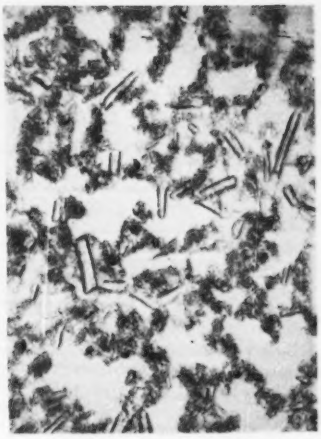
Any reference by an operator to belts being "4 or 5 in. longer than other belts on the drive" is usually exaggeration based on a misunderstanding on the relation between sag and belt length. Actually the amount of sag is very misleading, as can be seen by the table. On a center distance of 100 in. a sag of 2 in. will appear to be drastic, but it can be removed by only 0.054 in. of takeup on the motor base—less than 1/16 in.

Consideration should be given to apparent differences in belt length on V-belt drives caused by sheave grooves which have worn down unequally. Where such a situation exists, regrooving the sheaves or replacing them with new ones would be the most economical procedure.

Takeup Table for Correcting Belt Sag

Distance Between Centers In.	Sag, Inches ½	1	2	3	4	5	6
20	0.037	0.130	0.513	1.080	...	...	...
30	0.025	0.095	0.343	0.780	1.51	...	...
40	0.010	0.074	0.240	0.590	1.03	1.61	...
50	0.008	0.028	0.200	0.440	0.83	1.27	1.86
75	0.004	0.018	0.170	0.300	0.60	0.87	1.25
100	....	0.025	0.054	0.120	0.40	0.66	0 94
200	....	....	0.030	0.060	0.21	0.37	0.42
300	....	....	....	0.035	0.16	0.29	0.35

MAIN BED at Willsboro wollastonite quarry yields about 1,000 tons of ore per ft. along the strike. Reserves are estimated at 15 million tons.



—325 MESH (magnified 100 x) is one product. Wollastonite has many uses.

Wollastonite—A New Industrial Mineral

RAYMOND B. LADOO
Consulting Engineer
Newton, Mass.

ADD "WOLLASTONITE" to the growing list of non-metallic minerals being mined and marketed today. This calcium metasilicate ($CaSiO_3$) already has found more than a dozen applications, including use in floor and wall tile, welding rod coatings, alloying agents, and soil conditioners.

Strictly speaking, wollastonite isn't new. Nearly 15 years ago a deposit in California was mined briefly to supply material for white mineral wool. During World War II small amounts from New York State were used on an experimental scale. But construction of a commercial plant to produce industrial wollastonite products was only started late in 1949.*

This new development is now operated by the Willsboro Mining Co., Inc., of Willsboro, N. Y., of which P. E. Hatch is president. This company leases the deposits from Northern Minerals, Inc., Koert D. Burnham, president. Mr. Burnham is responsible for the many years' drive behind the project which has finally brought it into commercial production.

Wollastonite is a calcium metasilicate, $CaSiO_3$, white in color, with a hardness of 4.5 to 5. A 325-mesh product has a natural brightness averaging 92 on the Hunter reflectometer. It is brittle, with a fibrous cleavage, and has an index of refraction of 1.616 to 1.631. It commonly occurs as a metamorphic mineral associated with garnet in metamorphosed limestones.

Aside from the deposit in Kern County, California, the only reported deposits of commercial importance are those near Willsboro and Essex in Essex County, N. Y., half way up the west side of Lake Champlain. Here, in a belt of contact metamorphosed sediments about ¼ mile wide, there are three main beds of wollastonite rock which can be traced for a distance of about 6 miles. The beds strike N 60-65° W and dip about 15° NE. The main bed, 30-35 ft. thick, yields about 1,000 tons of ore per foot along the strike down to a depth of about 100 ft. Reserves are estimated at 15 million tons.

There's Garnet Too

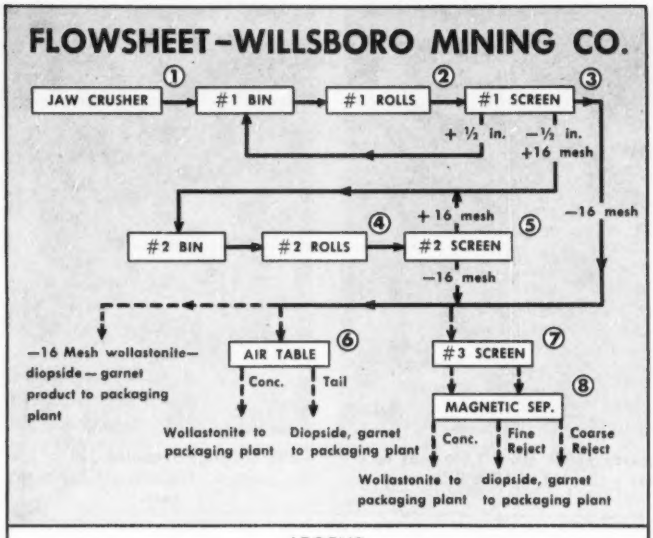
The ore consists of bands of pure white wollastonite intercalated with layers of red brown andradite garnet up to 8 in. thick. At the wollastonite-garnet contact there is usually a thin layer of green diopside (salite variety). Irregular masses and stringers of collophonite garnet are, in places, associated with coarsely crystallized wollastonite. As mined and milled, this ore yields about 75% recoverable wollastonite, 15% garnet and 10% waste.

The main bed, so far worked, is mined as an open pit along the south flank of a hill into which the bed dips. To a vertical depth of about 100 ft. a ratio of wollastonite rock to hanging wall waste (gneiss) of about 1 to 1 can be maintained. When the waste-to-rock ratio becomes more than 1 to 1, underground mining will be started.

Quarrying is now done in 8-ft. benches along the strike. Drilling is done with jackhammers with standard Timken bits. Due to the friability of the ore, drilling is very easy and blasting is very effective. The ore is shot down, and large pieces are block-holed. A Caterpillar D4 bulldozer pushes it into trucks spotted in loading docks below quarry floor level. When this method of loading becomes impractical, a Bay State 2-yd. shovel will be used. No waste is sorted at the quarry except for occasional pieces of obvious gangue (after overburden has been removed in advance of mining). Dump trucks, 2 to 2½ yd. in size, haul the ore about 3 miles to the mill. The mill is located on the main line of the Delaware and Hudson R. R.

On the company's property, about

*The 1948 Minerals Yearbook contains exactly four lines on wollastonite.



LEGEND

1. 10 x 20-in. Climax jaw crusher.
2. 14 x 20-in. Buchanan rolls.
3. 3-deck, 40 x 80-in. Rotex screen.
4. 10 x 20-in. Farrel rolls.
5. 3-deck, 20 x 72-in. Robertson screen
6. First alternative in handling the –16 mesh material is to separate wollastonite from garnet and diopside on air table.
7. 2-deck 36 x 60-in. Hum-mer screen splits feed to a 70% coarse and 30% fine product.
8. Wollastonite breaks clean from garnet and diopside on 3-roll, 30-in. double drum Exolon magnetic separator. First tails are rerun with 7% additional recovery, bringing total to 72%. Diopside and garnet can also be separated magnetically.

VERSATILITY was the chief aim in design of the mill which has both production and pilot plant to produce a wide variety of products.

1½ miles from the mill, north of the wollastonite deposit, there is an extensive but slightly developed deposit of grayish white diopside (canaanite variety), associated, in places, with graphite and quartz. A typical analysis shows: SiO_2, 54.72%; MgO, 25.88%; CaO, 12.44%; R_2O_3, 6.64%. Some research has been done on this material and the mill has been designed to permit commercial production if important uses are developed.

Wollastonite has several characteristics which make its milling a rather simple problem. The pure wollastonite is very friable, which makes crushing and grinding easy and which results in unusually high capacities of grinding equipment. A second characteristic is that practically all of the associated minerals are sufficiently magnetic so that a clean wollastonite product may be made by the use of high intensity magnetic separators.

Wollastonite has many potential uses, calling for products of differing physical and chemical properties. Since it is not yet clear in what relative volumes these different products will be sold, the new mill has been designed more for flexibility than for operating efficiency. It combines the features of an experimental pilot plant with those of a practical production unit. It permits the commercial production of three separate mineral products, wollastonite, garnet and white diopside. (See flowsheet.)

It will be noted that all the secondary crushing is done in rolls. This is to make granular products best adapted to magnetic separation and dry tabling. While magnetic separation is now done at about 16 mesh, rolls when set close will give a remarkably high production of 100 mesh fines due to the friability of the wollastonite.

How It's Milled

The milling process at present is essentially as follows: The crude ore is coarse crushed in a 10x20-in. Climax jaw crusher, elevated to a surge bin and fed to 14x20-in. Buchanan rolls, set to about ½ in. The crushed ore is fed to a 3 deck* Rotex 20x80-in. screen and the +½ in. is returned to the No. 1 rolls. The –½-in. +16 mesh product is sent to the No. 2 rolls (10x20-in. Farrel), set to about 16 mesh. This product is separated over a Robertson 3 deck, 20x72-in. screen, into a +16 mesh oversize, which is returned to the No. 2 rolls and a –16 mesh product. From here on there are several alternatives.

The –16 mesh product may be binned, packed and shipped without further treatment or it may be split into size fractions and treated to separate the wollastonite from the garnet either by high intensity magnetic separation or by dry tabling.

Magnetic separation may be done on either an Exolon high-intensity induced-roll, 3 roll, double bank, 30-in. separator or, experimentally,

*Multiple deck screens are provided at several points but all decks are not used at this stage in the development.

in a small Dings, 2 roll, single bank separator. Wollastonite breaks clean from garnet and diopside and a clean wollastonite product may be made. The iron content of the green, salite variety of diopside which occurs with the wollastonite is high enough to permit removal of both it and the garnet by high intensity magnetic separation. The diopside may also be separated from the garnet by rerunning on the Exolon separator. Screen splits are so adjusted that about 70% goes into the coarse fraction and 30% in the fines fraction. On the first pass about 65% of the feed is recovered as a clean wollastonite product. The first tailings are rerun with about 7% additional recovery, making a total of about 72% wollastonite recovered from the crude ore. The final garnet-diopside tailings may be used for concrete sand.

Products are shipped both in bulk and in bags. Bagging, at present, is done in a home-made bagger because the problem of designing an automatic packer to handle products varying in bulk density from under 0.3 to over 2.0 has not yet been solved. Probably eventually two different types of packers may be needed. Present plant capacity is about 100 tons of –16 mesh product per day.

Wet process and chemical process products are at present made in outside laboratories but they will later be made here in a separate plant.

As noted before, this plant, in an early stage of the development of a new product, is designed as both a production and a pilot plant. A comparatively large number of bins and elevators are provided and equipment is so located that many variations in the flowsheet may be readily made.

Typical Analysis

A typical analysis of the wollastonite product is as follows:

SiO_2	50.90%
CaO	46.82
Fe_2O_3	00.50
MgO	0.85
Al_2O_3	0.78
TiO_2	0.08
Na_2O	0.08
	100.01

In June, 1947, the Office of Technical Services of the U. S. Dept. of Commerce made a contract with the New York State College of Ceramics, Alfred University, Alfred, N. Y., to study methods of milling, beneficiation and utilization of this wollastonite. Ceramic phases were handled at Alfred and a sub-contract was made with Hirozons, Inc., of Cleveland, Ohio, to study chemical phases of the problem. This work, which was reported by Amberg and McMahon,[1] developed much basic information of value in designing a mill flowsheet and suggested many possible uses.

How It's Used

Uses for wollastonite may be divided into two general groups—those for the natural, mechanically beneficiated products and those for chemically treated products. Each group may be further subdivided into classes, based on the physical and chemical properties of the products. There are also a few uses for the crude material, ground but not beneficiated.

Uses for natural wollastonite include ceramic bodies (such as floor and wall tile), glazes and bonds (as for abrasive wheels); as a filler in paint and paper and for many other filler uses; in metallurgy, as a welding rod coating, to control viscosity of slag; as an iron oxide scavenger, slag cover, and alloying agent. By one method of milling a fibrous, cottony aggregate is produced which has special filter and filler applications, such as in bulk and block insulation, and as a diluent for asbestos fiber in magnesium oxychloride cement products. In coated paper a blend of 2-micron wet ground wollastonite and kaolin upgrades the clay and permits a cheaper clay to be used. As an additive to concrete it greatly increases the strength of Portland cement. The Tennessee Agricultural Experiment Station[2] and others have shown that, as a soil conditioner, it is three times as effective as agricultural limestone and is a partial substitute for calcium phosphate.

Wollastonite reacts readily with various acids, such as sulphuric, hydrochloric and phosphoric, and with alkalies such as sodium carbonate. Thus there can be made chemically a wide variety of products. For example, if finely ground wollastonite is mixed with sulphuric acid in proper proportions to form a paste, an exothermic reaction takes place, which results in a dry powder whose bulk volume is 5 to 10 times that of the original reaction mixture. This product is essentially a mixture of silica gel and calcium sulphate. If 5 to 10% of the sulphuric acid is replaced by phosphoric acid, the products made are whiter and they have increased hiding power and oil absorption. By calcining beneficiated wollastonite with sodium carbonate, leaching with water, wet ball milling, filtering, washing, and drying, a reconstituted $CaSiO_3$ or hydrous calcium silicate of very small particle size may be made. By these and similar methods white pigments of particle size as small as 20 to 50 millimicrons have been produced. Numerous patents have been obtained on such special treatment.

One of the best developed of these chemically prepared pigments is one for use as a paper filler. Commercial, large-scale paper mill runs have demonstrated eleven points of marked superiority over paper clay. These include higher retention (over 80%), better color, brightness of over 94 on the General Electric reflectometer, better ink receptivity, higher strength, and better smoothness.

A cement may be made from wollastonite by mixing with phosphoric acid, using boric acid as a set retarder. This mixture, cast in flexible molds and fired at 2,200° F., makes a hard, strong, dead white product which may be sawed, nailed, drilled and cut without tearing or splitting.

An unusually interesting ceramic product may be made from wollastonite using glass cullet and bentonite as binders. Formed into sheets or tiles ¼ in. thick, it has remarkable strength and resistance to shock. It can be sawn and it can be drilled with an ordinary drill. Nails may be hammered into it without cracking and they are held nearly as firmly as in wood. These properties are probably due to the interlocking, needle-like fibers which are more or less elastic. Weather resistance is good. Suggested use is as a fireproof exterior sheathing in places where asbestos-cement sheathing is now used.

Many other uses have been suggested, some of which have been partially demonstrated. But enough has been done already to insure the development of this new industrial mineral.

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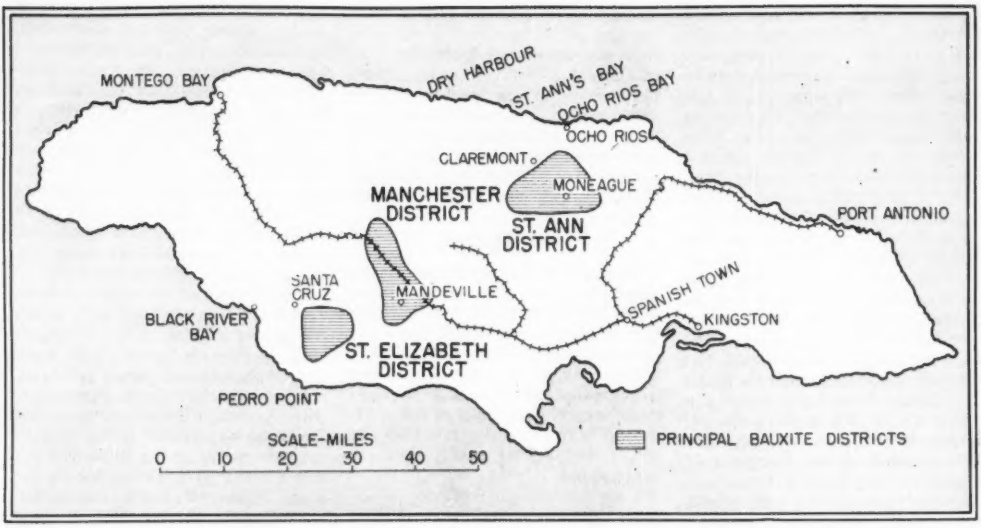
See also Broughton, J. G., and Burnham, Koert D., Occurrence and Uses of Wollastonite from Willsboro, N. Y., AIME Tech. Pub. 1737, Min. Tech., July, 1944, 8 pp.



JAMAICA'S WEALTH is scattered. The St. Ann area will enjoy the first development, but eventually bauxite mining and processing will help most of the island, now an economically weak member of the British Commonwealth.

First Caribbean Bauxite

...will strengthen American security by providing a nearer source,

Reynolds Jamaica Mines, Ltd., assisted by an ECA loan repayable in aluminum ingot to the Government stockpile, is constructing the first project that will put the important Caribbean aluminum ore deposits, discovered during World War II, into production.

O. C. SCHMEDEMAN
Vice President
Reynolds Jamaica Mines, Ltd.
Little Rock, Arkansas

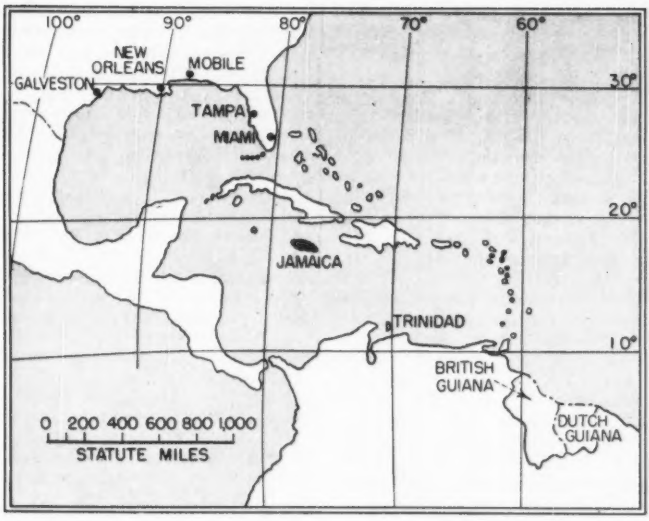
LARGE SCALE DEVELOPMENT of the aluminum ore fields of the Caribbean is now actively underway. This article has been prepared to report the nature and progress of the first of these developments, that of Reynolds Metals Company in Jamaica.

This $14,000,000 project is being carried out through a new subsidiary, Reynolds Jamaica Mines, Ltd., under the terms of an agreement executed Jan. 24, 1950, with the Strategic Materials Division of ECA. Construction and design work is being handled by the Frederick Snare Corp., New York, in conjunction with Reynolds engineering staff.

The extent and nature of these new Caribbean aluminum ores has been described in detail in a previous issue of E&MJ[1] and will be only briefly reviewed here. The

BAUXITE AT THE GRASSROOTS—view of main plant site, looking toward barrier ridge and harbor. Tramline will carry ore over hill and down steep descent beyond.

[1] O. C. Schmedeman, "Caribbean Aluminum Ores," Engineering & Mining Journal, June, 1948, pp. 78-82.



STRATEGIC LOCATION—Jamaica is less than half the distance *to* the Guianas, and the sea lanes are more defensible by short-range units.

Development . . .

with abundant reserves

original discovery was made in Jamaica in 1942 and was followed by similar though smaller finds in Haiti and the Dominican Republic in 1943. All four of the primary aluminum producers of North America now have a stake in one or more of these fields. Aggregate reserves of all grades are of the order of 350,000,000 tons, of which 90% or so is in Jamaica, with the remainder about equally divided between Haiti and the Dominican Republic.

BUILDING OF DOCK is progressing at Ocho Rios bay. Fill for oil storage in foreground. Reef which protects harbor can be seen extending from point on right.

The magnitude and significance of these new discoveries may be appreciated by comparison with present North American reserves and requirements. Such reserves are entirely confined to the U. S., and aggregate about 50,000,000 tons. Of this quantity, only a small fraction is reported to be of prewar or shipping quality. Present consumption of the U. S. and Canada is at the rate of about 4,500,000 tons annually. In the peak war year of 1943 it exceeded 6,000,000 tons.

The general quality of the Caribbean ores is much superior to that of the average remaining U. S. reserves, though somewhat inferior to other major foreign reserves. The silica content is extremely low, averaging around 2.5%, with large tonnages less than 1.0%. The alumina content, however, is also low, averaging around 50% as compared with 55% to 60% for foreign ores generally.

The aluminum is principally in the form of trihydrate, gibbsite, but some deposits contain appreciable quantities of the monohydrate, boehmite. The straight trihydrate ores can be treated in existing North American Bayer process alumina plants with minor modifications of equipment and practice, but efficient utilization of the mixed ores will require more extensive modifications in the form of higher pressure digestors and additional steam and evaporator capacity to conform more closely to European practices.

Physically, the Caribbean ores are very much like soils and, in fact, they support a fairly good growth of grass which is used for cattle grazing, particularly in Jamaica. The fundamental particle size is extremely fine and the consequent difficulties and prejudices encountered in the processing of these ores closely parallels those experienced in the introduction of the "soft" Mesabi ores in the steel industry during the latter part of the 19th century.

The ores occur directly at the surface without any overburden as such, though the top few inches of sod cover will be removed before mining. The orebodies occur in basin-like depressions in limestone and vary greatly in shape and size. Some deposits are essentially continuous for several miles, while others are limited to an acre or less. The average surface area is around 10 acres. Thickness varies, ranging between a foot or so to as much as 114 ft., the average being about 25 ft. in the principal deposits.

In addition to the unique virtue of being directly at the surface, these ores have the further great advantage of being located close to deep water, and generally within 25 miles or less of fair to excellent deep-water harbors. Elevations of the deposits range from 300 to 5,000 ft. above sea level, with the average being around 1,500 ft. This factor creates the principal difficulty in the exploitations of some districts.

The district presently being opened by Reynolds Jamaica Mines, Ltd., includes the original discovery deposit and embraces some 10,000 acres situated in the eastern portion of the Parish of St. Ann, about six miles inland from Ocho Rios Bay on the north coast. The deposits in this area lie at elevations of from 1,100 to 1,500 ft. above sea level on the deeply etched slopes of a large interior basin. The north slope of this basin rises gently from 1,100 ft. to 1,900 ft. before falling off sharply to the sea in a distance of only 15,000 ft.

Tramway Chosen

The steep seaward slope of the barrier ridge at this point precludes the use of rail or truck haulage to the sea except at great expense. A further difficulty in this regard arises from the unusual situation of a highly developed resort area all along this part of the coast.

This transportation problem will be resolved by means of an aerial ropeway at least until such time as tonnage requirements may justify a belt conveyor. This line is being designed and built by Ropeways, Ltd., London. It will be in two sections with an aggregate length of 33,000 ft. Buckets and hangers will be made largely of aluminum to increase the carrying capacity of the system.

At the shore a major development is now in progress to provide storage and shipping facilities. These are located at the foot of a precipitous bluff on the south shore of Ocho Rios Bay, a beautiful but small and entirely undeveloped deep-water harbor. Protection from ordinary seas is afforded by a coral reef which encloses a good portion of the seaward side. Six fathoms or more of water is found behind the reef and to within 500 ft. of the land throughout the western portion of the bay.

The high-steep bluff along this western portion of the bay has made it necessary to excavate a sizable chamber in the bluff to provide room for storage silos. The rock from this work has been used as fill to form an oil storage tank yard at the water's edge and an approach for the pier. The pier is "L" shaped, with each leg about 500 ft. in length. The depth of water available along the front of the wharf will be a minimum of 35 ft. in order to accommodate ships of the largest sizes.

Pier piling is of 12-in. and 14-in. steel H sections and the deck will be of concrete. A conveyor belt will extend from under the storage silos to the head of the pier, discharging at that point to an elevated conveyor feeding a traveling tower loader. The loading out works are being supplied by Drag Scraper and Engineering Co., Ltd., London, in conjunction with Fraser and Chalmers, Kent, England. The storage silos and oil tank will be fabricated in England and erected by the Chicago Bridge and Iron Co.

The ore will be transported in a specially designed self-unloading carrier to a Gulf Coast port and thence by rail to the processing plant at Bauxite, Ark. This vessel is being built in England by Vickers-Armstrong, Ltd., to designs prepared by Sir Joseph W. Isherwood & Co., Ltd., in conjunction with Reynolds marine department. Its principal specifications are: deadweight, 13 150 tons; length between perpendiculars, 500 ft.; breadth, 66 ft.; and draft when loaded, 29 ft. The self-unloading feature is expected to reduce greatly the long turn-around time presently experienced in the bauxite trade at Gulf Coast ports.

Development in the mining area is largely of a conventional nature, including staff housing, roads, water wells and supply system, repair shops, office, laboratory, power plant and drying kilns. Extensive use of aluminum sheet and other products is being incorporated in the design of all buildings to overcome the extreme weathering conditions of the warm humid climate, and to develop their appearance in harmony with the countryside. The unusual beauty of the region, particularly along the shore, has focused special attention on means of preserving it, and of avoiding disharmonious structures and operating conditions to the greatest possible extent. Particular efforts are being made to beautify the port and housing area and plant yard through an extensive program of landscaping and plantings of flowers, flowering shrubs and trees. In addition, at the drying plant the unusual precaution has been taken of installing a large electrostatic dust collector to insure that there will be no unsightly dust plume from the kilns.

The dust collectors are of the Cottrell type and will be supplied by Research Corporation. Traylor Engineering & Manufacturing Company is supplying the drying kilns and auxiliary equipment.

The 40-cycle character and the scarcity of local power supplies has necessitated installation of a complete power plant and distribution system to supply the entire power requirements of the project. The generating equipment will consist of 450-RPM 5-cylinder Nordberg diesels direct connected to 60-cycle General Electric generators. Jacket water cooling will be accomplished by Trane all-aluminum radiator-type coolers. Transmission lines will be stranded aluminum.

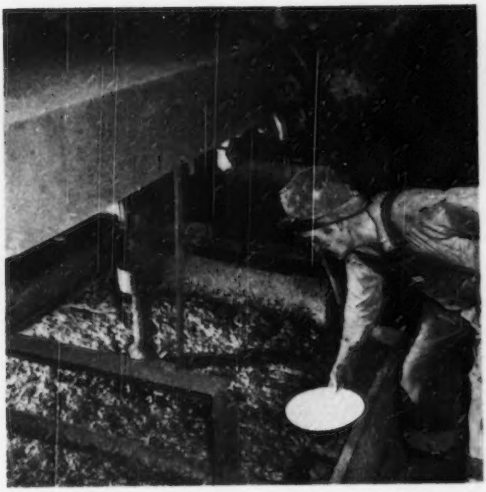
Rough terrain in the area of initial mining has dictated employment of a belt conveyor from a central hopper to the kilns. Mining will be accomplished by various types of heavy excavating and earth moving equipment.

Government Finance

Financing and general encouragement has been provided by the ECA agreement previously referred to and is, without doubt, the most outstanding feature of this project. This arrangement provides the advance of both dollar and sterling funds by ECA and repayment by Reynolds of both advances together with interest to the U. S. Munitions Board stockpile in aluminum ingot. The sterling portion comes from "5% counterpart funds" earmarked by Congress for U. S. Government use, particularly for strategic and critical material acquisition. In addition, important guarantees and concessions are being granted by the Jamaica Government to assure stable and reasonable operating conditions. In turn, Jamaica and the British Empire will obtain a dollar-earning industry and the U. S. economy a new, strategically-located source of a vital raw material.

President of Reynolds Jamaica Mines, Ltd., is Walter L. Rice, Richmond, Va. William S. Cole, Jr., Lydford Post Office, St. Ann, Jamaica, is resident manager of Jamaica operations. He is assisted by R. R. Williams, chief engineer; H. L. E. Chenoweth, accountant; Rudolph Jobson, personnel officer, and H. Keith Coxe, ranch manager.

LEAD FLOTATION is improved by better circuit control, change in reagents, new Agitair cells. Here Carl Thomas vans a sample of lead rougher froth to see how he's doing.



ZINC FLOTATION is improved by regrinding and separate treatment of middlings. Here Mike Chockie goes after a sample of zinc rougher froth to check operation.

Modernizing New Jersey Zinc's Eagle Mill — PART II

New mechanical cells, automatic pH control, uniform pulp temperature, improved reagent scheme, zinc middlings reground, helped improve lead-zinc flotation.

LESS TIME need be taken now for this pH checking job that used to be part of George Gillian's duties.

J. G. CRAIG
Gilman, Colo.[1]

This is the second of two parts of Mr. Craig's article. The first, dealing with crushing, grinding, soluble salt removal, and slime flotation in the Eagle mill, appeared in our issue for October, 1950.

FINISHED PRODUCT from the grinding section and the conditioned slime concentrates are fed to the lead rougher section, as shown in the flowsheet on page 102.

Rougher float time is about seven minutes. The pulp averages about 40% solids. Amyl xanthate and pine oil are stage-fed through the rougher circuit as needed. Temperature is held at 70° F. (±5° F.) by adding live steam to the mill-water going to the grinding circuit.

Rougher froth is pumped to the cleaning circuit, with plenty of water added. Water is also added liberally to each cleaner froth. The purpose is to dilute the reagents and aid cleaning. We have found that if we cut down on this water, we get a thick, gummy, non-selective froth.

A little sodium cyanide is added to the lead cleaner feed to help drop out zinc and iron minerals. No other reagents are used in the lead cleaner section.

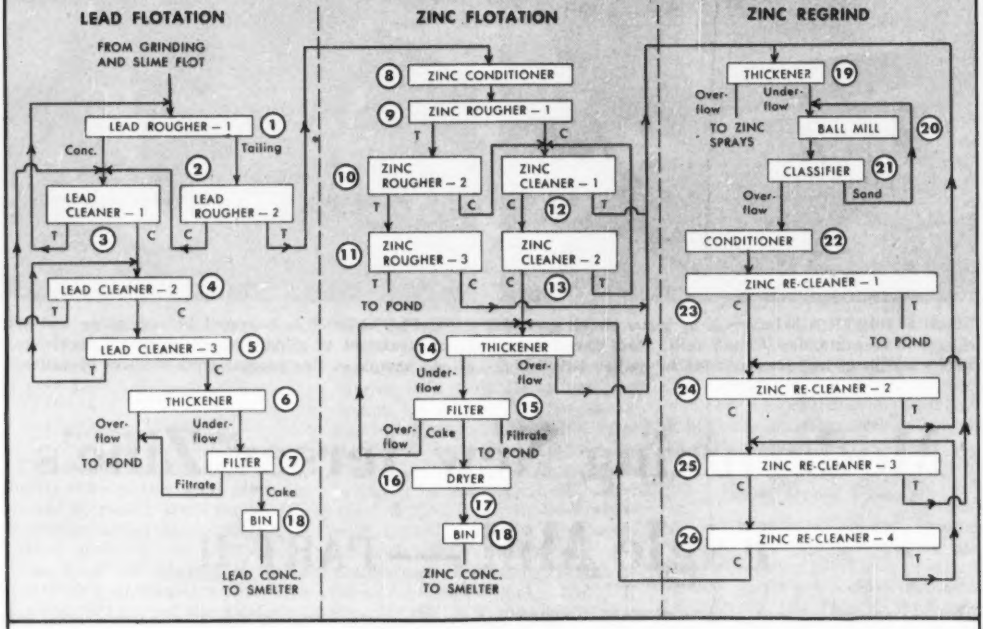
Rougher feed runs about 1.25% Pb. Final cleaner concentrate runs about 70% Pb and 4% zinc. About 83% of the lead is recovered in the lead concentrate.

One man on each shift controls the slime flotation section and the lead section. He also collects mill feed and lead concentrate samples and prepares them for assay. A typical screen analysis of our lead concentrate appears in Table III. (Tables I and II appeared in Part I of this article.)

Lime is batch-mixed with water in 1,000-gal. tanks to a 20% slurry

[1]Mill Superintendent, Empire Zinc Division, New Jersey Zinc Co., Gilman, Colo.

EMPIRE ZINC DIVISION - NEW JERSEY ZINC CO.
EAGLE MILL FLOWSHEET - PART II



LEGEND

1 Four Agitair No. 48 cells

2 Eight Agitair No. 48 cells

3 Two Denver No. 21

4 One Denver No. 21

5 One Denver No. 21

6 Hardinge thickener, 20-ft. diameter

7 Dorrco filters, 4x6-ft.; cotton fabric cloths, No. 175-TW, last 6 to 9 months; takes 16 man-hours to change set

8 New Jersey Zinc special conditioner, 24x6½-ft. (See text)

9 Eight Agitair No. 48 cells

10 Four Agitair No. 48

11 Four Agitair No. 48

12 Six Denver No. 21

13 Four Denver No. 21

14 Two Hardinge thickeners, 20-ft. diameter

15 Eimco 7-disk filter, 6-ft. diameter, filter cloths of No. 175-TW fabric last two months. Operators change cloths "on the run"

16 Christie dryer, oil-fired, rotary, indirect heat, 55-ft. x 80 in. Dryer revolves at 6 rpm., powered by 40 hp. motor

17 Elevator, and drag conveyor to bins

18 Belt conveyors, zinc conc. only is weighed by Chatillion Telepoise, Stephens-Adamson car loader into box cars

19 Hardinge thickener, 30-ft. diameter

20 Hardinge ball mill, 2x4-ft

21 Akins classifier, 24-in

22 Denver conditioner, 4x4-ft

23 Eight Agitair No. 36 cells

24 Four Denver No. 18 cells

25 Two Denver No. 18

26 Two Denver No. 18

and is stored in two 3,000-gal. tanks at the head of the mill. The lime is kept in suspension in these tanks by four propeller-like agitators, and the slurry is fed by gravity to the lime feeder. This feeder, a two-cup Geary Type-B reagent feeder, feeds lime to the grinding section and to the zinc section.

A Brown-Beckman automatic pH system controls the lime to maintain a predetermined pH in the lead roughers. A recording meter makes a continuous record of pH in the first lead rougher cell.

A relatively constant amount of lime is fed to the grinding mills to provide the necessary time for conditioning ahead of lead flotation in the absence of any conditioners as such. Varying pH, resulting from changing ore conditions, is controlled automatically with the Brown-Beckman system.

Before we had this system, the operators tried to control the lead section pH by taking periodic spot samples and manually adjusting the lime feeder. With widely varying ore conditions, this check-and-adjust system produced very erratic pH conditions.

The major benefits realized from automatic pH controls are listed as follows:

1. Much smoother pH control in the lead section, which is reflected in steadier pH in the succeeding zinc circuit.

LESS TIME is needed for paper work when using calculator, even in one-fingered style shown here by Harry Neil.

ZINC CONCENTRATE comes off filter at 11% water, is dried to 4%. Ben Ellis checks quality of cake.

2. More consistent and better lead flotation results.
3. Less lime reagent used.
4. Much less time spent by the operator on pH control, allowing him more time for other important duties.

Special Conditioner

Preparatory to zinc flotation, the lead tails are conditioned for four minutes with copper sulphate, lime, and potassium amyl xanthate. This is done in a horizontal rotary conditioner, 24 ft. long by 6½ ft. inside diameter, designed by the New Jersey Zinc Co.'s engineering staff.

This conditioner is driven at 3 rpm. with a 7½-hp. motor. It contains numerous baffles within the shell, which thoroughly agitate the pulp as it flows through the conditioner by gravity. This design was employed because of excess power needed in the conventional type of conditioner to keep our high gravity ore (4.5 sp. gr.) in suspension. This conditioner has been in operation for five years with little or no maintenance cost and with very little wear on the baffles or shell.

The pulp flows by gravity through the zinc rougher circuit as shown in the flow sheet. Pine oil and amyl xanthate are stage added as needed at four points in the rougher circuit. The froth from the first 12 roughers is pumped to the cleaner feed while the froth from the last four roughers (scavengers) joins the cleaner tails to the retreatment section.

Table III. Typical Screen Analyses of Several Mill Products

Mesh Size	% Indiv. Retained	% Cumul. Retained
LEAD CONCENTRATE		
+ 48	0	0
+ 65	0.8	0.8
+100	2.4	3.2
+150	5.1	8.3
+200	10.7	19.7
+270	14.7	33.7
—270	66.3	100.0
ZINC TAILS		
+ 48	1.5	1.5
+ 65	3.3	4.8
+100	8.0	12.8
+150	12.7	25.5
+200	17.2	42.7
+270	12.7	55.4
—270	44.6	100.0
ZINC CONCENTRATE		
+ 48	0.6	0.6
+ 65	2.3	2.9
+100	7.9	10.8
+150	14.0	24.8
+200	16.6	41.4
+270	13.7	55.1
—270	44.9	100.0
MILL TAILS		
+ 48	1.6	1.6
+ 65	3.1	4.7
+100	7.2	11.9
+150	14.1	26.0
+200	18.5	44.5
+270	11.0	55.5
—270	44.5	100.0

The zinc rougher retention time is about 14 minutes, with the solids in the rougher pulp about 30%. Pulp temperature in the zinc rougher cells is held at about 65° F., which is the normal temperature drop from 70° F. at the lead roughers. No provision is made for heating the pulp in the zinc roughers, consequently it is necessary to maintain the correct temperature at the lead section. The critical temperature for good zinc flotation results seems to be about 55° F., below which zinc recovery decreases rapidly.

Heating Required

No reagent combination has yet been discovered whereby acceptable flotation results can be maintained on the Gilman ore without heating the pulp. The upper temperature limit has not been defined, although higher temperatures tend to decrease selectivity, producing lower grade zinc concentrates.

The temperature of the mill water, pumped from the Eagle River, of course, varies with the season. During the winter months it is 32° F., but after passing through the pumps and the grinding section, the temperature is raised to about 45° F. Introduction of live steam into the water added to the grinding section increases the temperature to the required flotation range.

The feed to the zinc roughers, containing about 13% zinc, is raised to about 50% in the final zinc concentrate, with about 94% zinc recovered. The theoretical maximum for the marmatite contained in the

TAILINGS DAM, five miles below Gilman, is almost pure pyrite. Gordon Craig, mill superintendent, studies possible shift in flume for better distribution.

Gilman ore is 54% zinc. The zinc cleaning circuit is shown in the flowsheet. Zinc middlings are reground as shown.

All pulp leaving the mill (zinc tailings, retreatment tailings, slime tailings, tank overflows, etc.) passes through a mill tailings sampler before being rejected to the tailings pond. This sample contains about 1.00% zinc and 0.22% lead.

Typical screen analyses of the zinc tailings, zinc concentrates and mill tailings are shown in Table III.

One man on each shift controls the operation of the zinc section and the regrind-retreatment circuit, including preparation of the zinc tails, zinc concentrate, and mill tails samples.

Previous to 1947 the lead and zinc flotation circuits used air lift (Forrester type) flotation machines. Following is a list of advantages and disadvantages realized in the change from airlift to mechanical machines:

Advantages:

1. Improved concentrate grade and slightly lower zinc tailing.
2. Approximately 100% increase in cell capacity for a given floor area. This is important in all underground mills.
3. Fewer number of pumps to transport pulp.
4. Greater ease in handling the cells in respect to froth control, pulp level, sanding, etc.
5. Less air required.

Disadvantages:

1. Increased maintenance cost with mechanical cells.

It should be mentioned that a change from a soda ash-aerofloat circuit to a lime-xanthate circuit took place at approximately the same time the cell change-over was made. This will mask any metallurgical advantages.

Zinc Regrind

The first zinc cleaner mids plus the froth from the last four zinc roughers are thickened ahead of regrind. The tank overflow is pumped to the spray water system at the zinc section, thus re-using this warm water containing a slight amount of solids. The thickened tank underflow (±40% solids) is fed to a ball mill in closed circuit with a classifier. A small amount of sodium cyanide is added to the ball mill feed to depress pyrite.

The classifier overflow is conditioned for two minutes with copper sulphate. Amyl xanthate and pine oil, as needed, are added to the conditioner discharge before it enters retreatment flotation. This involves roughing in eight Agitairs, followed by a 4-2-2 cleaning operation in eight Denvers, with counter current flow of mids and concurrent flow of froth. The final stage retreatment cleaner froth joins the main circuit final concentrate at the zinc concentrate sampler.

The retreatment mids, containing about 30% zinc, are upgraded to about 40% zinc in the retreatment rougher froth, and then increased to about 48% zinc in the final retreatment cleaner froth. The retreatment rougher tails average about 3% zinc, but with a relatively small amount of solids in this product.

Normally the feed tonnage to the retreatment circuit is ±6 T/hr., which includes the circulating load between the retreatment roughers and cleaners.

Following are the advantages and disadvantages of this regrind-retreatment circuit:

Advantages:

1. The circulating zinc middlings load was reduced from about 45 T/hr. to about 6 T/hr.
2. By removing the mids load from the roughers an increase in tonnage to the rougher circuit was made possible.
3. Operators can recognize changing ore conditions more readily with mids out of the main circuit.
4. Made it possible to obtain somewhat higher zinc concentrate grades.
5. Isolated the "difficult" mids in one circuit where they can be handled more satisfactorily.
6. Relieved the main circuit cleaners.
7. By eliminating the recirculating mids load to the zinc roughers, the rougher flotation time was increased from nine to fourteen minutes.

Disadvantages:

1. Necessary to run more machinery with attendant operating and maintenance problems.
2. An additional set of roughers and cleaners for the operators to watch and control. Generally the more a circuit can be kept intact the less are the chances for losses.

Typical screen analyses showing size reduction through the regrind mill are shown in Table IV.

Lead Concentrate

The lead concentrate from the final cleaner passes through a concentrate sampler and is pumped to a thickener at about 25% solids. The thickener overflow goes to the mill tailings sampler. The thickened tank product is pumped at about 65% solids to a Dorrco internal drum filter. The filtered concentrate, containing about 8% moisture, drops directly into a heated storage bin which has a capacity of 170 tons. Periodically, as necessary, the lead concentrate is loaded from the bin, via a series of four conveyor belts and a Stephens-Adamson car loader, into box cars. The cars are loaded by volume measurements and shipped via the D. & R. G. W. R. R. to the A. S. & R. smelter in Leadville, Colo.

Lead is filtered in the morning of day shift. Concentrates produced the rest of the day are held in the thickener tank.

Table IV. Typical Screen Analyses of Regrind Mill Products

Mesh Size	% Indiv. Retained	% Cumul. Retained
REGRIND MILL FEED (Zinc Mids)		
+ 48	0	0
+ 65	0.5	0.5
+100	2.0	2.5
+150	4.5	7.0
+200	7.1	14.1
+270	5.0	19.1
—270	80.9	100.0
REGRIND CLASSIFIER OVERFLOW (Re-treatment Cell Feed)		
+ 48	0	0
+ 65	0	0
+100	0.5	0.5
+150	2.0	2.5
+200	5.0	7.5
+270	6.0	13.5
—270	86.5	100.0

Zinc Concentrate

Final zinc concentrate passes through the zinc concentrate sampler and is pumped at about 30% solids to two thickeners in the drier room. Overflow from the thickeners is pumped back to the zinc section and joins the mids tank overflow to supply water to the launder spray system in the zinc circuit.

Thickened concentrate is pumped at about 55% solids to an Eimco disk filter. The filtrate, when clear, is sent to tails, and when dirty it is returned to the thickener tanks until the operator has a chance to make it clear by changing worn filter cloths.

The filter cake, containing about 11% moisture, is dried in a Christie oil-fired, rotary, indirect heat drier. Approximately 2½ gal. of oil are required to dry each ton of zinc concentrate from 11% moisture to 4% moisture. Dust formed within the drier is exhausted through a wet cyclone settling system with the solids returned to the circuit via the thickener tanks.

The dried zinc concentrate is elevated to six storage bins with a total capacity of 800 tons. From these bins the concentrate is loaded into box cars with the same conveyor system that is used to load lead concentrates. The zinc concentrate is weighed with a Chatillion Telepoise as it passes over one of the belts before it enters the car. Zinc is shipped to the New Jersey Zinc Co. plant at Canon City, Colo., for partial roasting and sintering before it is relayed to the New Jersey Zinc Co. smelter located at Depue, Ill.

Lead concentrate is not weighed on the Telepoise because the weight per foot of this heavier concentrate on a conveyor belt is out of the range of the instrument.

The operator on each shift controls the lead and zinc filtering and the zinc drying processes. Two men, on day shift only, load out zinc and lead concentrates.

Table V. Samplers Used in Eagle Mill and Typical Product Assays

Material Sampled	Time of Cut	Width of Cutter, in.	Sample Ratio	Type Sampler	Typical Assays Zn,%	Pb,%
Mill feed (coarse)	5 cuts, each 2½ min.	1¼	1/100	N.J.Z. design, chain-bucket-type	Not assayed	
Mill feed (fine)	1 cut, each 5 min.	1½	1/100,000	Geary	12.5	1.25
Lead concentrate	3 cuts, each 6¾ min.	¾	1/8,000	N.J.Z. design, Borcherdt-type	4.0	70.0
Zinc concentrate	1 cut, each 7½ min.	⅛	1/13,000	Geary	50.0	0.40
Zinc tailings	1 cut, each 7½ min.	⅛	1/12,000	Geary	0.80	Not assayed
Mill tailings	1 cut, each 5 min.	⅛	1/80,000	Geary	1.00	0.22

Table VI. Reagents Used and Points of Addition, Eagle Mill

Reagent	Where Added	Amount, lb./ton	Type Feeder
Aerofloat-25	No. 1 slime cell	±0.02	Clarkson
Aerofloat-25	No. 5 slime cell	±0.02	Clarkson
Sodium cyanide	No. 1 lead rougher	0.13	Clarkson
Sodium cyanide	No. 1 lead cleaner feed	0.06	Clarkson
Sodium cyanide	Slime froth conditioner	0.04	Clarkson
Sodium cyanide	Regrind mill	0.02	Clarkson
Copper sulfate	Zinc conditioner	1.25	Homemade wet dissolver
Copper sulfate	Re-treatment conditioner	0.07	Homemade wet dissolver
Hydrated lime	Grinding mills	±2.0 (Total)	Geary Type B
Hydrated lime	No. 1 lead rougher	±1.5 (widely variable)	Brown-Beckman pH system
Hydrated lime	Zinc conditioner	±4.0	Geary Type B
Hydrated lime	Slime froth conditioner	±0.5	Geary Type B
Potassium amyl xanthate	No. 1 lead rougher	±0.01	Clarkson
Potassium amyl xanthate	No. 5 lead rougher	±0.01	Clarkson
Potassium amyl xanthate	Zinc conditioner	±0.17	Clarkson
Potassium amyl xanthate	No. 1 zinc rougher	±0.05	Clarkson
Potassium amyl xanthate	No. 5 zinc rougher	±0.05	Clarkson
Potassium amyl xanthate	No. 9 zinc rougher	±0.05	Clarkson
Potassium amyl xanthate	No. 13 zinc rougher	±0.03	Clarkson
Potassium amyl xanthate	No. 1 re-treatment rougher	±0.01	Clarkson
Pine oil	No. 1 slime cell	±0.01	Clarkson
Pine oil	No. 1 lead rougher	±0.01	Clarkson
Pine oil	No. 5 lead rougher	±0.01	Clarkson
Pine oil	Zinc conditioner	±0.06	Clarkson
Pine oil	No. 1 zinc rougher	±0.02	Clarkson
Pine oil	No. 5 zinc rougher	±0.001	Clarkson
Pine oil	No. 9 zinc rougher	±0.001	Clarkson
Pine oil	No. 1 re-treatment rougher	±0.01	Clarkson

Data on sampler operation and on reagent additions are given in Tables V and VI.

Grateful acknowledgment is hereby given the New Jersey Zinc Co. for permission to publish this paper and to the following members of the Gilman staff for their help in preparing the paper: R. E. Radabaugh, chief geologist; J. R. Pellett, mill engineer; J. E. Nelson, mill engineer; H. E. Ames, mill engineer.

KEEPING TAB ON PRACTICE

Shaker Re-designed for Sticky Ores. One of Goodman's new style shaker conveyors is to be installed toward the end of 1950 by a prominent Lake Superior iron ore operator. It will be equipped with the semi-circular pans and special inclined cradles designed for greater effectiveness with sticky material. These features, with a change in drive mechanism to give the higher speed needed for moving ore containing paint rock and other sticky materials, constitute the main developments in the line mentioned. (See *E&MJ*, Feb., 1950, page 113).

Two shaker installations outside the industry are of interest. One is in a plant that has to handle blazing hot material coming from a furnace. Two shaker lines were put in to take the material "for a ride into the country" until cool. The other instance involved use of a shaker conveyor 50 in. long to dispose of cuttings from a shear. There appeared to be no other way.

Transport Combined With Jumbo. D. I. Hayes, western manager, American Zinc, Lead & Smelting Co., Spokane, has developed his self-loading transport for handling rough materials considerably beyond the status it had when described last year (*E&MJ*, Feb., 1950, p. 114 and *MCJ*, May, 1949). In addition to other modifications, the up-to-date model, now in operation in the Grandview mine, in Washington, can be converted into a stope-drilling jumbo in 20 minutes. This makes it an all-purpose machine for mining and, according to Mr. Hayes, solves the problem of speeding up the entire excavation process. Thus employed, it uses a 2-man utility crew for either loading and transport or drilling and blasting.

The original transport was actuated by slusher hoist cables. The present machine is powered by a 440-volt, ac. squirrel-cage 1,800 rpm. motor, driving through a fluid coupling to gear reduction. Power is supplied through a stationary, automatic conductor cable reel. The new model loading transport is self-propelled, ridden by the operator, and carries a 2-ton load. It is adapted particularly to grades steeper than those that can be taken by power-driven, traction-tired wheels or crawler tracks. At present it is working on 20 to 40% grades.

According to Mr. Hayes, the simple fundamental mechanical principles involved are adaptable to variable conditions and the transport should have a wide application on surface as a self-loading dump truck for handling loose material, however rough.

U. S. Patent 2518471, Aug. 15, 1950, has been issued. A Canadian patent has been allowed but not yet issued. Application has been filed in a number of foreign countries. The original U. S. application was made early in 1947.

Carbide-Tipped Steel at Lake Shore. Results obtained with carbide-tipped steel and air-leg pluggers by Lake Shore Mines, Ltd., Kirkland Lake, Ont., have been extremely good, according to J. C. Adamson, mine superintendent, writing Sept. 14. The company has 27 Model 655-W Atlas-Diesel drills. About 40% of the drilling is being done with this equipment. The necessity of training the men is retarding the addition of more equipment. (See also *E&MJ*., Aug., 1949, p. 80).

Average footage obtained per rod from mid-February, 1949, to the end of August, 1950, is 221 ft. During this period 259,625 ft. was drilled with this equipment. At the time of writing (Sept. 14) 250 ft. per rod was being obtained. The increased life is attributed to

(a) Remodeling the original collar of the rods to decrease breakage at the chuck end.

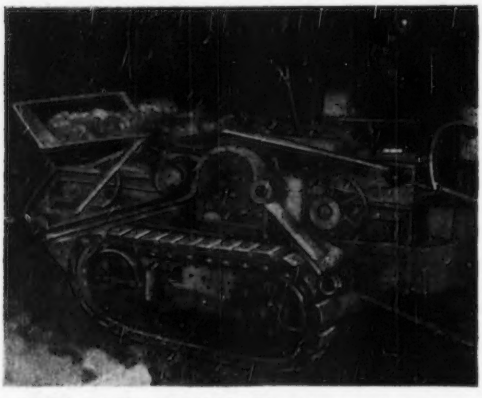
(b) Training of runners in the proper use of machine and steel.

(c) Keeping a close check on the condition of the carbide inserts to insure re-dressing at the proper time and in proper manner.

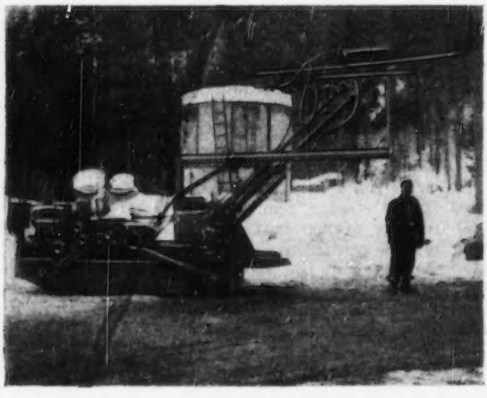
Average drilling speed is about 13 in. per minute in ground which, with 3½-in. machines and steel bits, would average 8 in. per minute.

Currently a new Atlas-Diesel model, 656-W, is being tested, which operates more efficiently on low-pressure air (80-lb) than the 655-W model. Initial results appear promising. This machine weighs 2 lb. more than the 655-W and costs $35 more. It uses 97.5 cfm., as against 85 for the 655-W. Cylinder and piston sizes are the same, with a slightly different back-head design.

In July, 1949, Lake Shore's mechanical superintendent, J. G. Purdie, started making tungsten carbide-tipped drill steel rods from ⅞-in. hexagon alloy steel with forged collars. The bit end is forged and machined, and chisel-type tungsten-carbide inserts are installed, using induc-



SELF-LOADING TRANSPORT underground at foot of muck pile, just after loading. It is ready to transport the material to the dumping point . . . At right, TRANSPORT



CONVERTED to stope drilling jumbo on the surface. This view was taken before the machine had been changed from wheel-support type to crawler-tread-support.

tion heating. The ends are then ground to the finished sizes.

Initially there were a number of wrinkles to iron out but progress has been satisfactory to date. It would appear that eventually Lake Shore will be able to turn out a drill rod equal to anything on the market, and at quite a reduction in cost. The life obtained from these Lake Shore rods from the start of production is 171 ft. The ones currently used are giving 208 ft.

The sizes made by Lake Shore are as follows:

First Series

4 ft. long, bit diameter 1.26 in.
6.5 ft. long, bit diameter 1.18 in.

These are used in square-set and fill stopes.

Second Series

2.6 ft. long, bit diameter 1.34 in.
5.25 ft. long, bit diameter 1.30 in.
7.9 ft. long, bit diameter 1.26 in.
10.5 ft. long, bit diameter 1.22 in.
13-15 ft. long, bit diameter 1.18 in.

These are for use in open rill and shrinkage stopes.

Application of this steel to development work still has to be worked out.

Is Re-tipping With Carbide Practical? Efforts are being made by Lake Shore to find out whether it is economical to retip a drill rod with tungsten after the insert has been worn out. To do this they simply cut the old bit end off and reforge and carry on as if it were a new steel. The old belief was that a steel that had drilled enough footage to wear a carbide insert out would be so fatigued as to be of no further use. Mr. Adamson says they have grounds to believe that this is not so, but they hesitate to make any definite statements yet, except to say that in actual production they have already had more than 100 ft. with the rods still in use. Results as yet are not conclusive.

Inserts are bought from Canadian General Electric Co., but the mining company is experimenting with several other makes.

Improvements for Trackless Mining. Joy's new 17-HR rock loader, a rubber-tired, self-propelled, continuous-type machine, ready for field tests. Two units are being shipped for the purpose. One was shown at the recent machinery exhibit in Salt Lake City. The answer to the problem of mucking haulage drifts of large cross section and small-bore tunnels is sought with this machine.

The power plant of the same manufacturer's Model 60 diesel-electric shuttle car is being re-engineered. Substitution of a 3-cylinder General Motors diesel engine for the 2-cylinder engine previously used, giving 50% more power, is expected to enable the car to negotiate fairly severe grades without any great drop in traction speed. Interest in this car is said to be growing.

The same maker's new rubber-tired, self-propelled Drillmobile, also exhibited at Salt Lake, mounts two of the company's new improved hydraulic drill jibs. The new jib has double-acting hydraulic cylinders which are self-locking. One is used for raising and lowering the drill, and the other for swinging the drill around a fixed swivel point so that drill and jib can be held rigidly in any position. Jib-movements are controlled by two levers and, as oil pressure is furnished by an air-driven oil pump, the manual labor of spotting holes is reduced to a minimum. A number of these machines are in operation in Southeast Missouri. Others are on order for iron mines in the Birmingham district.

What Price Scrap Carbide? What mining company is interested in the carbide remaining in its worn-out carbide bits? The Chem-Met Co., Riverdale, Md. (otherwise unknown to us) has asked for names of users of such bits, saying it is interested in recovery of scrap tungsten for conversion to usable tungsten compounds. The inquiry is the first of its kind. A carbide bit manufacturer reports that they know only of scattered instances where some mine shop has tried to put old inserts to good use but without results. The cost has been too high for present prices. However, the possibility of salvaging such carbide is interesting. The amount of carbide in a worn-out bit is an appreciable percent of that in the bit when new. How big would the market be? This leads to the question of how much tungsten is consumed annually in making bits.

For Carbide Drilling. Kennametal, Inc., has a new three-blade carbide-insert detachable bit, ranging from 1¼ in. to 3 in. in size. Ability to drill rapidly in both hard and medium rock and ravelly ground is claimed for it. Its design gives room, they say, for escape of cuttings and the bit is easily resharpened. It was shown at the recent exhibit in Salt Lake City.

A manufacturer of carbide-tipped forged rods and carbide detachable bits not hitherto mentioned here is W. J. Dunn & Co., Boston. We expect to tell something about their line soon.

The carbide-tipped sampling moil introduced some time ago by Hayes Steel Products, Ltd., Merritton, Ont., has been well received, according to the management. At McIntyre-Porcupine, one of these moil points cut 2,575 ft. of sample with four regrinds.

Factors in the Bit Picture. Hayes Steel Products, Ltd., is making two types of steel bits in Canada—the old type dovetail bit, reconditionable by forging, and the single-use PM bit. Aside from experimenting for themselves in a minor way with detachable carbide bits and carbide-tipped forged steel, they are the American distributors and licensees for Rip Bits, Ltd., Sheffield, England, who have been making carbide bits since the war, when information covering German practices became available. At present prices for carbide bits, the management expects to see carbide bits get about 30% of the market and steel bits 70%. This picture could change rapidly, depending on the international situation and the availability of supplies.

Thompson Products, Ltd., St. Catharines, Ont., are the sole manufacturers of the Liddicoat detachable drill bit in Canada. They own the world rights for this bit and have licensed other companies to make it. It should be understood that the bit referred to is Thompson Products L-type bit, a single-use bit, with the diamond pilot and has nothing to do with the Hollinger-type bit, a multiple-use bit, which is of the four-wing design with the Liddicoat detachment (see *E&MJ*, Feb., 1950, p. 109) and which Hollinger makes for its own use. Hollinger is understood to retain no rights in the bit now known as the Liddicoat. Calumet & Hecla and the Western Rock Bit Mfg. Co. of Salt Lake City, are separately licensed directly by Thompson Products. Prior to undertaking to make the Liddicoat bit under license for its own use and for sale, Calumet & Hecla used Timken detachable steel bits both for production and in development work.

This bit maker reports a substantially growing export business. Their bits have been shipped to many South American countries, as well as to Europe, Turkey and other areas. The management feels that the steel bit business will continue to grow, with developments in carbide bits (in which it is interested experimentally) as a complimentary part. Among other factors, it is taking into account the possible effect on the use of tungsten carbide of a large-scale war.

Rock Bit Sales & Service Co., Philadelphia, has added a detachable tungsten-carbide bit of the conventional flat-top type to its line of crown carbide bits, which were introduced late in 1949. The latter have the carbide inserts crowned, it was then stated, to increase drilling speed (*E&MJ*, Feb., 1950, p. 110).

How About Forged Alloy Steel? Dome Mines, Ltd., South Porcupine, Ont., is still using alloy steel with integral forged cross bits, as described in Charles Kemsley's paper (*E&MJ*, Aug., 1943), for approximately 50% of their drilling. At the time Mr. Kemsley (who retired May 1 last) described this practice there were 22 producing properties in Porcupine, Kirkland Lake and Western Quebec areas who were drilling with such steel. How about the other 21 companies? Never having had their names at the time, we are unable just now to inquire about the status of their practice.

WASHINGTON REFLECTIONS

Seabrook Hull, McGraw-Hill Washington News Bureau

NPA Steel Order For Priority Sales May Set Pattern In Non-Ferrous Metals

NPA's steel order—National Production Authority Regulation M-1—is probably a prototype of the sort of thing you can expect to follow shortly in zinc, copper and aluminum, later in other short materials, and even some components.

By setting percentage limits on the volume of "DO" orders any one supplier has to accept in any given month, NPA hopes to distribute the impact of mobilization equitably among suppliers and non-essential users alike.

Actually, both the copper and aluminum orders are almost all set to go. Only thing holding them up is completion of NPA's consultations with industry. It's here that actual percentages and specific procedures are being worked out.

As in steel, both of these orders are designed to give material suppliers assurance that their production won't be gobbled up disproportionately by "DO" orders, i.e., that disruption of their normal trade channels will be held to a minimum.

Meanwhile here's how the steel order is written:

If at any time a producer's "DO" orders for delivery in any particular month reach a certain stated percentage of his average monthly shipments during the January-August 1950 base period, the producer has the right to refuse acceptance of any more "DO" orders for delivery in that particular month, unless specifically directed otherwise by NPA.

Producers can also refuse to accept "DO" orders when acceptance would put monthly shipments (ingot tonnage figures) in excess of any month's scheduled production by 15% in the case of carbon steel and 25% in the case of alloy steel.

Suppliers can also turn down "DO" orders which call for delivery sooner than the buyer is going to need it, or if the order is placed less than 45 days prior to the month in which delivery is specified.

So far it's a supplier's law, having been framed in consultation with the steel industry. But the buyer does have some recourse if he is turned down everywhere he tries. He can go to the National Production Authority itself, which in special cases will give him a special "DO" order allowing him to place the order regardless of percentages.

If the supplier gets into trouble—undue hardship the law calls it—as a result of or in spite of this order he should appeal to the National Production Authority, Department of Commerce, Washington 25, D. C., Reference M-1.

Accelerated Depreciation May Be Boomerang

Accelerated depreciation may not turn out to be the bonus generally anticipated. The reader would be wise to take a second look before taking advantage of the five-year write-off provision included in the recently passed tax bill. That's the advice Government tax experts are passing out to their business friends.

However, if you do wish to apply for accelerated depreciation, make your initial application through the National Security Resources Board, Washington, D. C. After consulting with Interior's Defense Minerals Administration and receiving a favorable report, the NSRB chairman will issue a certificate of necessity.

The privilege of five-year write-offs on plants built for defense production can be a real blessing; but the experts say it can also cost your company dollars in taxes.

Just as in the last war, Congress wanted to give a break to businesses producing for defense; so it voted to let corporations write off the cost of plant expansions or additions out of defense profits. To set an annual rate, Congress had to vote an arbitrary limit to the defense period. The limit was five years.

Normally, a smelter or refinery might be written off in 30 or 40 years—or at an annual rate of 3 or 2.5%; big electric shovels (in the eyes of the Bureau of Internal Revenue) might have had a life expectancy of 10 or 20 years, and corresponding write-off rates of 10 or 5%. But if you were to build or buy any of these today to fill a defense need, you could get permission to set an annual depreciation rate of 20% on all new facilities.

But do you want to use this higher rate?

The answer is yes if your company will be needing some expansion money in the next few years and can't get all it wants through securities or a long-term loan. Putting an extra 10 to 18% of equipment cost into a tax-free reserve stretches whatever cash you have.

On the other hand, if your company has ready access to expansion money, accelerated amortization may be no bargain at all.

For companies planning investments with no post-emergency value, speedy write-offs can be a real boon. Come 1955, they won't have cash tied up in non-productive facilities. But if the company does intend to use the new capacity for peacetime production, then accelerated amortization once again offers no special advantage. By using the 20% rate, you may find you are trading some ready cash now for higher profits and taxes later.

To most executives concerned with corporation tax policy, it's a toss-up which way tax rates will go when the shortened write-off period is over. The experts are guessing that a great many will probably decide not to take advantage of the "relief" provision Congress has offered.

Huge Increase Sought In Aluminum Output

National Security Resources Board is angling around for some way to boost this country's 1.4-billion pound basic aluminum production capacity up to 3.4 billion pounds.

That doubles the 1-billion pound aluminum expansion figure that Munitions Board officials have been talking about.

Actually, NSRB hasn't any definite plans about how to go about hiking production that much. They've just gotten around to sending out queries to the industry's major producers as to their ideas on the subject.

Cost and power are two big problems when it comes to any large expansion of aluminum production. By rule of thumb, most experts figure that the capital-cost-per-pound of aluminum production expansion runs about 50c. That would mean $1 billion for plant alone. It would most certainly call for Government aid.

Government Goes Slow On Taconite Aid

How big a chunk of the Government loan money, $600 million this year or $2 billion in all, set up by the National Production Authority, will go for starting commercial production of taconite will depend on how important W. Stuart Symington decides the low-grade iron ore is to the mobilization effort.

Early last month Department of Interior was all set to go ahead with plans to get taconite into commercial production, but the National Security Resources Board told them to put the brakes on. There was a lot of money around to foster necessary industrial expansion, but Symington wanted to make sure a project was really necessary before he started parcelling the money out in $100-million chunks. And it would take at least that to get taconite into commercial production.

May Tax Excess Profits On Flexible Base

That an excess profits tax is inevitable seems to be taken pretty much for granted. It's the kind of excess profits tax that's still to be settled. Whether Congress ends up with a fixed-base tax or a flexible-base tax could make a big difference to the mining industry.

Many experts acknowledge that an excess profits tax discourages efficiency, but the political necessity seems inescapable, particularly considering the political influence of labor unions and their phobias against profits.

Actually, the way tax experts are thinking now, the final formula will be a compromise, one that lets the businessman take his best two-out-of-three or three-out-of-four years in a specified postwar base period. His average profits in these years would be considered normal. Any in excess would have to be counted as excess profits and taxed accordingly.

The actual percentage figure for the excess profits tax hasn't been settled yet, but the figure that is heard cropping up most often around Washington is 75%. Other profits would continue to be taxed according to "normal" rates.

Commerce Controls Metal Exports for Conservation

Conservation is the main reason behind Commerce Department's decision to include all non-ferrous metals on its export control list. It means hereafter that to export almost any non-ferrous metal you will have to get an export license, no matter who the buying country is. Canada is the only exception with whom trade will go on as usual.

All products will have quotas, though where there is no shortage that quota will be open-ended. That is, no limit on exports for that particular quarter. Quotas will be set for each up-coming quarter. Thus while exports of a product may be unlimited during one three-month period, they may have strict controls during the next three-month period.

It all depends on the condition of supply in the U. S.

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

LABOR TURNOVER: It is increasing, reflecting high employment and short supply. More workers are hired, or quitting, or entering military service. Fewer are fired or laid off.

IN METAL MINING: In August, hiring rate rose from 42 per 1,000 men employed to 57. Quits rose from 27 to 38 per 1,000. Military leaves were up from 3 to 5. Heaviest turnover was in copper mining. For every 1,000 employed, copper mines hired 69, lost 61 who quit, and 7 who went to war.

RESERVISTS: Defense Department will announc a policy so you can figure when men in reserves might be called. Truman forced it, to cope with refusal of some employers to hire reservists.

DRAFT: Selective Service wants to stick with men under 26. Young husbands will be taken soon. Fathers and (if Congress amends the law), young veterans will be next. Draft prospects for men over 25 and up to 35, not in foreseeable future; over 35, none.

MANPOWER: Developing a deferment policy that will retain necessary skills in industry is the first objective of Robert C. Goodwin, director of Labor Dept.'s new Office of Defense Manpower. Goodwin favors voluntary manpower measures, will go slow on compulsion of labor.

WAGES: The fifth round of wage increases won't be stopped by wage controls. Bureau of National Affairs examined 66 settlements in non-ferrous mining wage negotiations from January through September. Only one included a cost-of-living escalator. Eleven gave no increase at all. Most of the increases were in the 4-6c. and 7-9c. groups. They break down like this:

Cents Per Hour	No. of Contracts
1- 3	2
4- 6	29
7- 9	14
10-12	7
13-15	2
Over 15	1

STEEL: What happens in current steel negotiations will be reflected in wage demands on metal mining companies. Phil Murray's Steelworkers won't settle for less than 15c. an hour increase. That's about what Alcoa gave voluntarily. Steel wages average about $1.71 an hour.

AFL LOOKS AT MINING: AFL has sent its wage negotiators this advice on business outlook in non-ferrous metals: larger output; prices, if put under ceilings, near current levels; earnings, "sharply above 1949"; earnings position "good" if emergency continues.

COMMUNISTS: Wage policy just issued tells good Communists to be:

Against cost-of-living wage clauses, 5-year contracts, wage controls, no-strike pledges.

For wage reopening every six months, price roll-back to 1946 levels, heavy excess profits tax, Taft-Hartley repeal.

STRIKE STRATEGY: That's name of new book explaining Communist strike theories. Underlying idea is to spread the strike to other companies, other industries. When it's over, keep up agitation in plant or mine, never let up the struggle with management. Author is John Steuben, a genuine leftist. He's also editor of *March of Labor*, a monthly publication, revived since Korea to thread the Commie line through the labor movement.

NLRB: The 5-man Board has grabbed much of the power Congress denied when it killed Reorganization Plan 12 last May. George J. Bott, who succeeded Robert N. Denham as general counsel, is conforming to Board policies, thus surrendering the independence granted his office by Congress.

BACK PAY: Don't be confused by NLRB'S order that union must pay wages lost by employee it got boss to fire for failure to pay union fine. NLRB policy still makes both employer and union responsible for unlawful discharges. Exception in this case: If employee accuses only the union.

PORTAL PAY: Watch your portal-to-portal liability. The 1947 law didn't kill it completely. Wage-hour division has brought suit against four ship repair companies. Claim is that the hours men are paid for at straight time for travel to and from the work site must be counted as part of the basic 40-hour week, after which time-and-a-half begins. Industry practice has been to pay straight time for travel time plus 40 hours on the job site.

INJURIES: In line with national trend, frequency of disabling injuries last year dropped slightly in metal mining group. Injury records were worse, however, in lead-zinc, gold, and silver mining.

MARKETS—Trends and Prices (*Continued from page 69*)

Zinc Ore Production by Principal Countries

(American Bureau of Metal Statistics)

Zinc ore production by important countries, so far as available, expressed in terms of zinc content, figures in tons:

	March	April	May	June	July
United States (a)	51,212	49,113	51,785	50,184	48,898
Canada and Newfoundland (b)	25,021	23,388	30,694	26,670	.....
Mexico (c)	15,312	13,604	15,637	18,973	16,904
Argentina	1,016	777	1,221	1,185	1,327
Bolivia	1,445	1,579	1,836	1,735	1,539
Fed. Rep. of Germany	6,561	5,767	6,001	6,511	.....
Italy	7,385	5,513	6,575	5,947	7,113
Spain (h)	5,772	4,927	5,059	5,015	.....
Sweden (d)	3,999	366	1,769	7,493	3,596
Australia (f)	22,701	18,873	22,548	18,232	20,236
Japan	4,056	4,183	3,108	4,663	.....
North Africa (g)	1,027	1,019	2,295	2,427	.....
Southwest Africa	687	635	1,139	442	519
Rhodesia (e)	2,201	2,139	2,173	2,156	2,229
Totals	148,395	131,883	151,840	151,633	.....

(a) As reported by U.S.B.M. (b) New refined zinc plus recoverable zinc in concentrates exported. (c) Production of zinc concentrates by flotation process which falls a little short of the total. (d) Estimated content of exports. (e) Same as slab zinc production. (f) Gross zinc content of copper, lead and zinc concentrates. (g) Algeria, Tunis and Morocco. (h) Partly estimated.

Official London Prices

The British Ministry of Supply continues to fix delivered prices of copper, lead and zinc for the United Kingdom. Quotations in effect as October ended were as follows:

	Per Long Ton £ s. d.
COPPER	
Electrolytic, high conductivity	202 0 0
Fire refined, high conductivity	202 0 0
Fire refined, high grade	201 10 0
Fire refined, min. 99.7 percent	201 0 0
Fire refined, min. 99.2 percent	200 10 0
LEAD:	
Soft, foreign duty paid	128 0 0
Soft, Empire	128 0 0
English, refined	129 10 0
ZINC:	
Foreign (G.o.b.) duty paid	151 0 0
Domestic (G.o.b.) duty paid	151 0 0
Prime Western and debased	151 0 0
Refined and electrolytic	155 0 0
Minimum 99.99 percent	157 0 0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

October 31, 1950

Aluminum, ingot, 99 plus percent, lb. (base price)	19c.
Antimony, spot, lb., 5 tons and up but less than carload in cases	$35.280
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$2.40
Calcium, 1 lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$1.80
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	48c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	24½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$91.00
Selenium, 99.5 percent, lb.	$3.00
Silicon, minimum 97 percent, spot, carloads, lb.	16.50c.
Tellurium, lb.	$1.50@$2.00
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty

METALLIC ORES

Beryllium Ore, imported, 10 to 12% BeO, per unit	$26.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
45% Cr_2O_3, no ratio	$17.30@$18.30
48% Cr_2O_3, 3 to 1 ratio	$35.00@$42.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$8.10
Mesabi bessemer	$7.85
Mesabi, non-bessemer	$7.70
Lead (Galena), 80 percent, Joplin, Mo., ton	$205.27
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, @ 80c., c.i.f. U. S. ports, duty extra. Long-term contract prices nominal.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	54c.
Tantalite, 60% concentrate, per lb.	$2.00@$2.75
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, duty paid	$38.00@$39.60
Domestic, scheelite, 60 percent f.o.b. mine	$38.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo. per ton	$115.00

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	6c.
Cobalt Oxide, 72%, metallurgical grade, per lb. of Co	$1.85
Copper Sulphate, 100 lb.	$8.65

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of contained Be, 5 lb. or more of Be	$30.00
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	20.50c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$172.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo. contained	$1.22
Ferrosilicon, 50 percent, per lb. of contained Si	11.3c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.40
Ferrovanadium, per lb. of V delivered	$2.90
Silicomanganese, 1¼ percent 7, per lb. contracts	8.95c.
Spiegeleisen, per long ton, 19@21%	$70.00

NON-METALLIC MINERALS

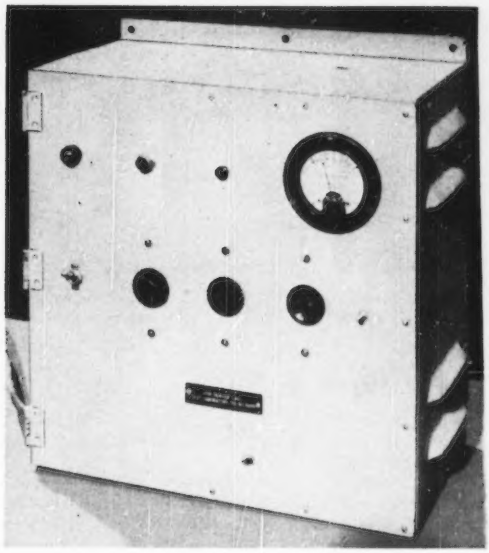
Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960@$1,050
Crude No. 2	$492@$550
Spinning fibers	$232@$475
Shingle fibers	$95.50@$141
Paper stock	$78.50@$88
Waste	$58
Shorts	$27@$52
Asbestos, Vermont, f.o.b. Hyde Park:	
Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00@$13.50
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.25@$9.50
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	$4.50@$5.50
Domestic, chemical, 55 to 58 percent	(a)$8.50@$9.50
Domestic, abrasive, 80 to 84 percent	$18.00@$18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50@$9.50
North Carolina ceramic grade	$20.25@$22.25
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50@$22.25
Glass par, white, 20 mesh	$11.75@$12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective CaF_2, ton	$39.00
Acid 97% concentrate, bulk, ton	(b)$46.50
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$33.00
Mica—Domestic, f.o.b. mines, Punch, 12 to 22c. per lb. according to size and quality. Sheet, clear, 1¼ x 2 inch, 70 to 75c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.40@$1.50; 3 x 3 inch, $1.70@$1.80; 3 x 4 inch, $2.10; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $120@$130 per ton. Bulk sales, dry ground, $32.50@$60.00 per ton. Scrap, $30 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton	$18.00@$22.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$30.00

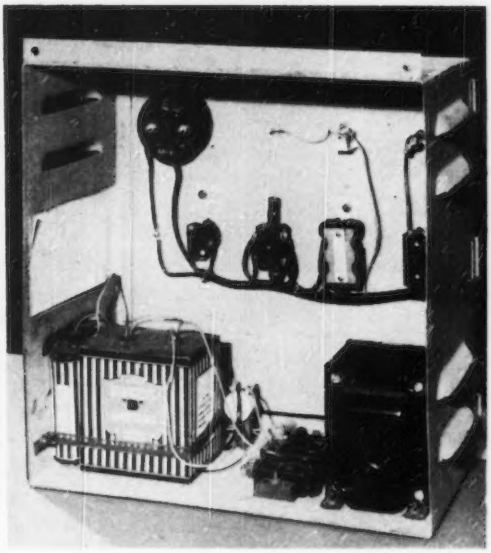
(a) Nominal. (b) Quotation in previous issue revised to $46.50.

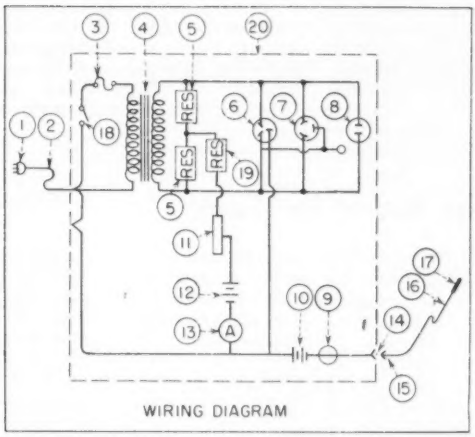
IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$46.00
Steel, f.o.b., Pittsburgh billets, net ton	$53.00
Structural shapes, 100 lb.	$3.40

OPERATING IDEAS







WIRING DIAGRAM

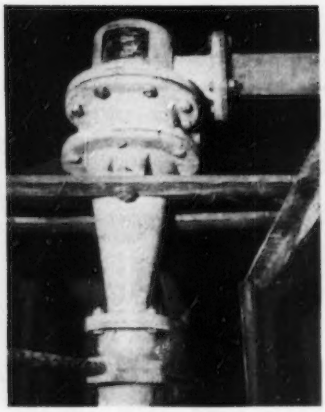
Key to Wiring Diagram

Item	Quan.	Description
1	1	3 p. Polarized plug.
2	10 ft.	No. 16 S. J. 3 0 cord.
3	1	Fuse extractor post with 8 amp. fuse.
4	1	250 V. A., 115 v.-115 v. transformer.
5	2	Fixed resistor 10,000 ohm, 5 w.
6	1	15-amp. single receptacle, 2 w., 3 p., polarized.
7	1	15-amp. single receptacle 2 w., 3 p., 115 v.
8	1	15-amp. single receptacle, 2 w., 2 p., parallel.
9	1	Indicator light assembly with miniature screw socket with green jewel and 6-8 v. Mazda lamp.
10	1	7.5-v. standard "C" battery.
11	1	1-megohm potentiometer, shaft slot for screw-driver adjustment.
12	1	90-v. "B" battery.
13	1	50-microammeter, d. c., 2100-ohm.
14	1	Insulated phone tip jack.
15	1	Insulated solderless phone tip plug to fit No. 14.
16	3 ft.	Flexible test lead wire.
17	1	5-in. solderless test prod.
18	1	1 p., 125 v., toggle switch.
19	1	Fixed resistor, 1.5 megohm, 5 w.
20	1	Terminal strip with 4 terminals.
21	16 ft	No. 14 switch-board wire, stranded.

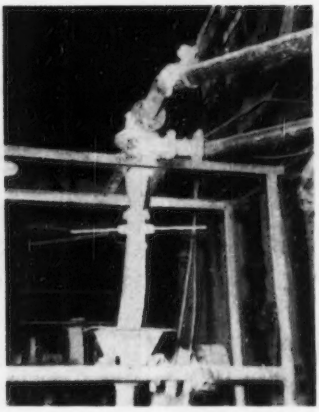
Testing Panel for Faulty Insulation

Electrical hand tools should be tested frequently for faulty insulation as well as for mechanical fitness. The unit shown here, submitted by Paul Ziemke, Oak Ridge, Tenn., has proved useful and effective for this purpose. It is a shop-built high-potential "Megger" which shows quickly whether insulation of an electrical tool is good or bad.

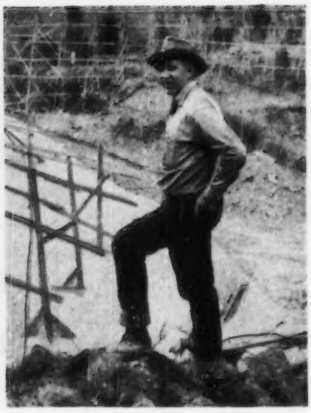
To test a tool, the plug is inserted into one of three receptacles corresponding to the plug type. The first receptacle (on the left in the photograph) is a conventional one used for three-wire cords having a ground lead; the second is a three-wire lock-twist type; and the third is a common "T" slotted unit found on non-polarized appliances. When the toggle switch is flipped "on" and the prod wire (attached to the stud next to the receptacle) is touched to an energized tool resting on a wooden bench, the meter will tell whether the insulation is "good" or "bad." The meter is set so that 1.5 megohms will indicate the demarcation between good or bad.



HANDLES AT BOTTOM of cyclone control operation of the separator.



30 TONS OF SOLIDS are handled per day by this small unit at Telluride



JOHN FERGUSON, mill superintendent of Telluride Mines, Inc.

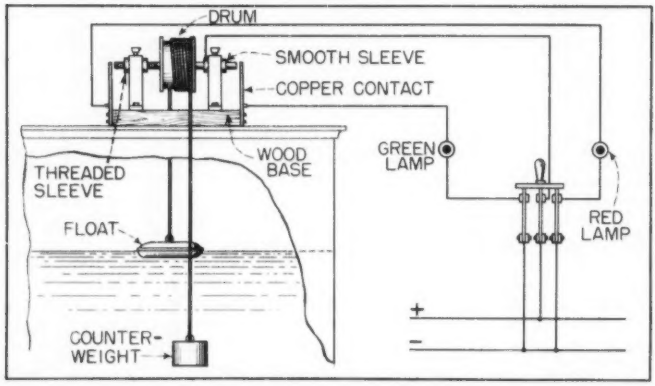
Dutch Cyclone Recovers Values in Slimes

Formerly slimes from a drag classifier in the crushing plant of Telluride Mines, Inc., Telluride, Colo., went to the tailings pile because it was uneconomical to recover the values contained. However, after the DSM Cyclone shown here was installed, this problem was solved. Today the slimes are diverted to a cyclone installed above the drag classifier in the grinding circuit. The result is that a substantial additional recovery is made from material formerly discarded.

Discharge from the cyclone contains 35 to 45% solids, most of which is around 200 mesh. Discharge from the cyclone drops directly into the classifier pool for subsequent treatment in the regular flotation circuit. It is estimated that the cyclone handles about 30 tons of solids per day and separates out about 14 to 18 tons of solids for treatment by flotation. Approximately 80% of the values contained in the slimes are thus recovered. Overflow from the cyclone separator is discarded with the mill tails.

John Ferguson, mill superintendent, reports that operation of the cyclone is very simple. All necessary adjustments are made by means of two handles at the base of the cone which control the discharge diaphragm of the unit. Feed pressure is of critical importance, the higher pressure giving the best weight and value recoveries. At Telluride, 35 to 30 psi. appears to give the best results.

High and Low-Water Alarm for Tank



The mechanical signal system shown will give dependable service on tanks and other storage vessels requiring a high and low-water alarm. The principal parts making up the installation include a wooden drum mounted on a shaft made from $\frac{3}{4}$-in. brass tubing, two steel supports, one fitted with a smooth sleeve or bearing and the other with a threaded sleeve; wood base; two copper contacts; float; and counterweight. The drum is encircled by four turns of cotton cord to which are attached the float and the counterweight. When the water in the tank is at a normal level, the drum is midway between the sleeve supports so that the ends of the shaft stand away from the copper contacts attached to the ends of the base. If the water level falls, the drum and shaft rotate as the float sinks, causing the shaft to advance toward the left contact and closing the circuit when the lowest permissible stage is reached. This lights the red lamp. The same action takes place when the water level rises, with a green lamp being lighted upon closure of the circuit when the highest stage is reached.

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You can count on instant starting and rapid acceleration when your locomotives, trammers and shuttle cars are powered by Exide-Ironclad Batteries. They help speed up car changes, keep your loaders busy and main line haulage moving fast. They give you lasting power—assuring uniform speeds straight through to end of shift. Also, with Exide-Ironclad Batteries you eliminate unscheduled down time for repairs, resulting in more production per man per shift.

The Exide-Ironclad Battery is *DIFFERENT* from all other batteries in design, construction, performance. The outstanding difference is the *exclusive* positive plate. Since 1910, this plate has continued to prove its superior operating characteristics and exceptional long life in more than 100,000 heavy-duty jobs . . . and at operating and maintenance costs that are extremely low.

Combined, the important characteristics of Exide-Ironclads provide safe, dependable full-shift power for mine haulage units, making Exide-Ironclad Batteries the best power buy . . . *at any price.*

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PERSONAL NEWS

Abe P. Morris, pit superintendent at Chino Mines Division, Kennecott Copper Corp. at Santa Rita, N. M., has been appointed assistant to the general manager of Kennecott operations at Ray, Ariz. A native of Iowa, he received his professional training at the Iowa Engineering School and the New Mexico School of Mines. Other promotions include that of **Walter E. Herkenhoff** to assistant mine superintendent at Santa Rita; **W. Howard Winn** to assistant smelter superintendent; **Kenneth V. N. Harris** to general mine foreman; **Dan G. Thorne** to general maintenance foreman.

DR. FRANCIS A. THOMSON, president of Montana School of Mines since 1928, has resigned, effective Sept. 15, due to ill health. Born in England, he came to Montana by way of British Columbia, where he lived until he was ready to enter college. He received his E. M. degree at the Colorado School of Mines, and also attended the Royal School of Mines in London and the Ecole des Mines in Paris. In 1908 he was made head of the department of mining engineering at Washington State College, later became acting dean of the college faculty. Later he became dean of the School of Mines of the University of Idaho, where he remained until his appointment at Montana School of Mines. Dr. Thomson received both M.S. and Doctor of Science degrees from his alma mater.

Leonard C. Yancey and **Frank Storms** have been appointed vice presidents of the Iron Mines Company of Venezuela. Mr. Yancey, formerly vice president and manager of the Bethlehem Chile Iron Mines Co., will manage the Venezuelan operations. Mr. Storms, who was formerly manager of sales for the Ingersoll-Rand Co. for Venezuela and Colombia, will be in charge of the Caracas office.

Samuel Gustavson, mineral commodity specialist, has been named to head a newly-created Statistical Branch of the Federal Bureau of Mines at Minneapolis, Minn. The announcement was made by **Paul Zinner,** Regional Director of Region V. The duties of the new job will include gathering and assembling into reports important economic and statistical information on iron ore, lead, zinc, gold, silver and copper production, and on other mineral trends throughout Region V.

Melford H. Salisbury, mining engineer of Cripple Creek, Colo., who has been superintendent of the Portland mine for the past 18 years, has accepted a civil service position with the U. S. Bureau of Mines at Leadville, Colo. He will be resident engineer at the Leadville drainage tunnel. Mr. Salisbury is a graduate of the Colorado School of Mines.

Z. W. Bartlett, assistant general superintendent at the Grande Ecaille property of Freeport Sulphur Co., is now assistant to the general manager in the New Orleans office.

M. S. Fotheringham, formerly vice president and general manager of Steep Rock Iron Mines, Ltd., has been elected president of the company. He suceeds the late **Gen. D. M. Hogarth.** Mr. Fotheringham has been with the company since 1939, serving as general superintendent of mining from that time until 1944. **Cyrus S. Eaton,** of Cleveland, was re-elected chairman of the board of the organization.

The following geologic positions in the various British Colonial Geological Surveys are open. A minimum of five years' post-bachelor experience is required. For further information, write to Chief, Alaskan and Foreign Geology, U. S. Geological Survey, Washington 25, D. C.

Nigeria—1 senior geologist for work on mineral deposits (GS-13); 2 geologists for work on mineral deposits (GS-11 or GS-12)

Gold Coast—1 senior geologist for work on mineral deposits or areal mapping (GS-13); 1 geologist for work on mineral deposits or areal geology (GS-11 or GS-12)

Sierra Leone—1 geologist for work on mineral deposits or areal geology (GS-11 or GS-12)

Tanganyika—2 ground water geologists (GS-11 or GS-12)

North Borneo and **Sarawak**—1 geologist for work on fuels and paleontology (GS-11 or GS-12); 1 geologist for work in mineral deposits and petrology (GS-11 or GS-12)

Topographic Engineers — There are a number of openings for various grades of topographic engineers.

Orlo E. Soland has been appointed **assistant superintendent of** timber lands for Oliver Iron Mining Co. A native of Minnesota, he has been associated with Oliver's timber department since 1934. Mr. Soland will be located at the company's general offices in Duluth.

C. E. Mills, general manager of the United Verde branch of Phelps Dodge Corp. since 1948, has been named assistant manager of the Copper Queen branch with headquarters at Bisbee, Ariz. **W. W. Little,** mine superintendent, succeeds him.

ARTHUR E. ADAMI, vice president of the Montana School of Mines since 1928, and dean of the college since 1943, has been named acting president to succeed Dr. Francis Thomson, who has retired. A native of Helena, Mont., he received a degree in mining engineering from Montana School of Mines in 1907. He instructed in various departments of the school from 1908-11, and served as assistant, and associate professor of mining engineering successively from 1912 until 1926, when he was made professor. In addition to his teaching experience, Mr. Adami served as an engineer for several mining companies, and also engaged in private engineering work. He has made a study of the different mining districts in the West, Alaska and British Columbia.

Glenville A. Collins, mining engineer, returned recently to his home office in Santa Barbara, Calif., after spending some time in the field in northern British Columbia. He examined several uranium showings, including those at Bridge River and Hazelton, B. C.

Robert L. Coe, president of Chase Brass & Copper Co., Inc., subsidiary of Kennecott Copper Corp., has been elected chairman of the board, according to an announcement by **Charles R. Cox,** president of Kennecott. **Richard C. Diehl,** former general manager of the Steubenville, Ohio, plants of

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EUGENE D. GARDNER

MANY NOTABLE contributions toward a fuller and wiser use of the Nation's basic mineral resources have been made by Eugene D. Gardner, chief mining engineer of the Bureau of Mines. Better known as "Ed" to his friends and associates, he has a background of more than 30 years' experience in the development of more efficient mining practices. His career with the Bureau began in 1918, when he conducted investigations in the art of drilling and blasting in metal mines while a member of the staff of the Southwest Experiment Station at Tucson, Ariz. He became supervising engineer of the station in 1926. With the aid of a staff of mining engineers headquartered at Tucson, Reno, Salt Lake City, and Moscow, Idaho, he undertook a study of western mining and milling methods and costs. He supervised the preparation of a series of papers on methods and costs of mining and milling, and during this period also directed the metallurgical work of the station.

Mr. Gardner organized and directed an intensive search for domestic sources of strategic minerals in 1939. Within two years after he began the exploration of selected deposits of antimony, chromite, manganese, mercury, nickel, tin and tungsten, this relatively modest program was expanded to include more than 50 diamond drilling, trenching and sampling projects in states west of the Mississippi and in Alaska.

During World War II he was regional engineer of the Central Region, where he was responsible for exploration and metallurgical research and the construction and operation of laboratories and pilot plants.

Following a tour of duty with the State Department in North Africa and Italy, in 1945, Mr. Gardner was placed in charge of the Bureau's oil-shale mine at Rifle, Colo. As director of this project, he demonstrated the feasibility of applying low-cost mining methods to the mining of oil-shale. It was at this demonstration that he was awarded a citation for distinguished service and a medal by the Department of the Interior.

A native of West Jordan, Utah, Mr. Gardner attended the University of Utah, where he graduated with a B.S. degree in mining engineering in 1906. Nine years later, the degree of Engineer of Mines was conferred upon him by his alma mater. Before joining the Bureau, he held engineering posts with private mining companies, and served for several years as mineral examiner in the Forest Service of the Department of Agriculture.

Mr. Gardner's service in key administrative assignments in the Bureau of Mines has been marked by outstanding skill and ability in the performance of his duties, by organization and planning of superior quality, and by successful supervision and direction of both mining research and mineral exploration programs. He has been cited as being "always remarkably successful in enlisting the cooperation of industry" to obtain authorization to use operating mines as laboratories and to publish private cost information of immense value to the metal mining industry at large. Individually and in collaboration with others, he is the author of more than 50 publications, including standard reference works, as well as numerous technical journal articles.

Mr. Gardner is a friend, counselor and teacher to a generation of young engineers in the Bureau of Mines. He has willingly accepted the responsibilities of leadership and invariably has enjoyed the loyal support of his staff members, to whom he has given all credit for their achievements.

Wheeling Steel Corp., has been elected president.

Earl Sackett, formerly assistant division metallurgist at Malvern, Ark., for National Lead Co., has been made superintendent of the Washington County, Missouri, operations for the Baroid Sales Division of the company.

Eugene S. Allen, formerly mill superintendent, St. Louis Smelting & Refining Div. of National Lead Co. at Fredericktown, Mo., has resigned to take over the duties of assistant superintendent of concentrators for Cerro de Pasco Copper Corp. in Peru.

George McKereghan has been transferred from northern Michigan to Shullsburg, Wis., as engineer with Calumet & Hecla Consolidated Copper Co., Wisconsin branch.

E. Nouviaire and **J. Robinet** were on the Mesabi range in September as a part of a seven weeks' tour of United States mining areas. Six other French engineers are currently investigating American mining districts as a preliminary to large-scale open-pit mining plans for French-operated iron ore mines.

A. H. ROBERTSON, who was in charge of the first exploration in the Allard Lake district of Quebec and has been in charge of the construction program of Quebec Iron & Titanium Corp., has resumed his position as vice president and general manager of Kennco Explorations, Ltd. He has been succeeded by Frank E. Walling.

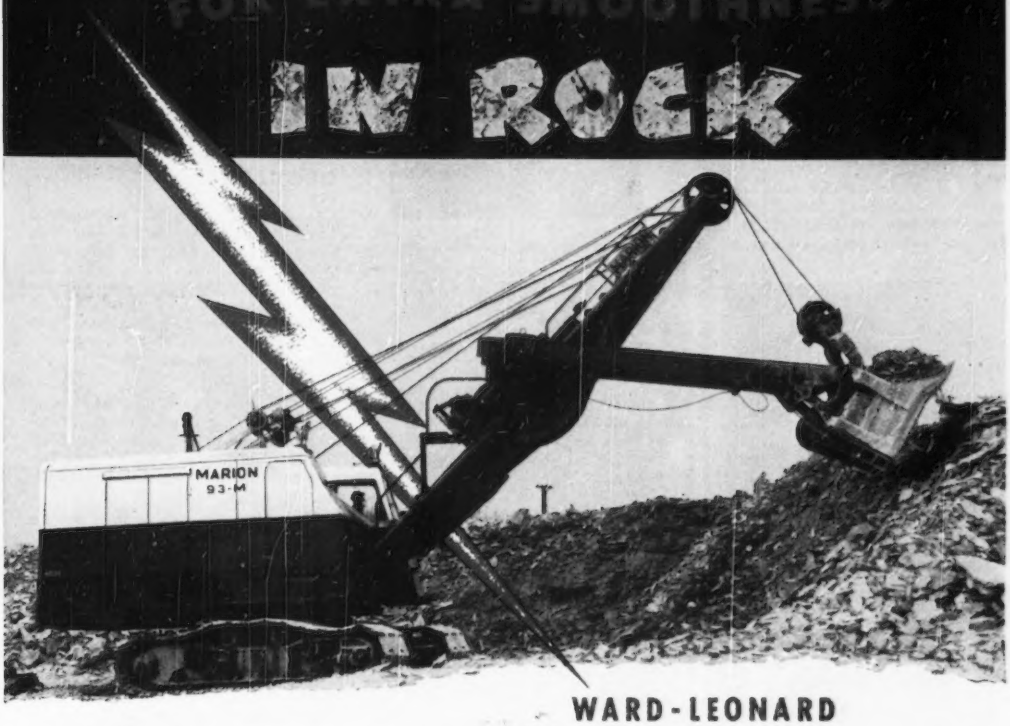
W. Bruce Peck, a Spokane city official, has been elected a director of the Morning Glory Mines, operating north of Troy, Lincoln County, Montana.

Louis V. Olson, Salt Lake City, has

FRANK E. WALLING, formerly general manager of the lumber division of Weyerhaeuser Timber Co., has been appointed general manager in charge of Canadian operations of Quebec Iron & Titanium Corp., according to an announcement made by Anton Gray, president. The company is a subsidiary of Kennecott Copper Corp. and the New Jersey Zinc Co.

FOR EXTRA SMOOTHNESS

IN ROCK



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The new MARION 93-M Ward-Leonard Electric shovel digs rock with smoothness you'd never expect from a 2½-3 cu. yd. machine.

There's no jerking—no hesitating—no "stuttering" when the dipper comes up through a rock pile. There is power to spare, applied so smoothly that there is no machine strain or breakage.

This is the kind of smoothness that pays off in longer machine life, greater daily yardage and greater dependability.

From its long, wide, steady crawlers to the big, reversible dipper teeth, here is a MARION designed and built for service in rock digging.

The 93-M is built to MARION standards of quality that mean year-after-year dependability and true, long-range economy. It is backed by 66 years of shovel design and manufacturing experience.

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been named director of the Department of Agricultural Research, American Smelting & Refining Co. He succeeds **Dr. George R. Hill**, who has retired but will be retained as a consultant.

J. F. Reid, manager of Rand Leases Gold Mining Co., Ltd., who has recently been in New York after a tour of several Canadian and United States mining districts, sailed for South Africa, Oct. 19. He will return via Great Britain.

W. H. Leverett has been elected president of National Zinc Co. to succeed **B. Elkan**, resigned. **F. R. Jeffrey** is newly-elected treasurer.

SHELDON P. WIMPFEN, former editor of Mining Congress Journal, is on the staff of the manager of Raw Materials Operations, Atomic Energy Commission. He is working on special problems of uranium production.

E. S. McGlone, Butte, vice president in charge of Western operations of Anaconda Copper Mining Co.; **Kuno Doerr, Jr.**, manager of the East Helena plant of American Smelting & Refining Co., and **Carl J. Trauerman**, Butte, manager of the Mining Association of Montana, were elected Montana members of the Governing Board, Western Division, of the American Mining Congress for the ensuing year.

Karl A. E. Berg, who was recently appointed manager of the Northern Pacific Railway Co.'s iron ore properties, has resigned because of ill health.

"Some Aspects of American Wire Rope Practice in Mining" was the title paper prepared by **Harlan A. Walker**, assistant general manager of Homestake Mining Co., and Josiah Gerrans, chief mechanical engineer of Homestake. The paper was presented at the Conference on Wire Ropes in Mines arranged by the Institution of Mechanical Engineers, the Institution of Mining Engineers, the Federation of Wire Rope Manufacturers of Great Britain and other technical societies.

R. G. Mace, who retired as purchasing agent for Oliver Iron Mining Co., is now located in Phoenix, Ariz., where he has moved from Duluth.

JOHN C. FOX, former associate professor in mining, Columbia School of Mines, Columbia University, has been named to succeed Sheldon P. Wimpfen as editor of Mining Congress Journal. He has been author of the "New York Letter" of the Canadian Mining Journal for several years.

Duane Myers, superintendent of the Iron Mountain mine, Iron Mountain, Mo., has been transferred to the Iron River, Mich., district. He will serve as general operating engineer. Mr. Myers, who has been at Iron Mountain for about two years, has been succeeded by **William F. Shinners**, superintendent of the Clifton mine in New York.

Oscar Dammen, of Virginia, Minn., on the Mesabi, is in Venezuela in charge of exploration and development work at the Ciudad Bolivar property of U. S. Steel's Orinoco Mining Co.

O. PERRY RIKER, who has just completed two years as mining consultant with the ECA in Athens, Greece, has been reassigned to Bangkok, Thailand, as mining adviser to the Government of Thailand.

R. W. Whitney, general manager of Minnesota Mines, M. A. Hanna Co., was recently appointed a member of the Lake Ore, Coal and Vessel committee. Other members of the committee, formed for the purpose of aiding the movement of iron ore and coal on the Great Lakes, are **J. E. Machamer, Grover Holt, A. D. Chisholm** and **Hugh Harrison**.

Clifford William McCoy, a junior in metallurgical engineering at Carnegie Institute of Technology, has been awarded the Lewis E. Young award for the year 1950-51. This award, given on the basis of character and high scolastic achievement, is presented by the Women's Auxiliary of the American Institute for Mining & Metallurgical Engineers in honor of Dr. Young, past president of the Institute.

OBITUARIES

George J. Eisele, 83, who retired Aug. 31, after 60 years in the iron mining industry and an employee of Oliver Iron Mining Co. since its organization in 1902, died Sept. 5. He was formerly general superintendent of Oliver's Michigan operations and had been in charge of the company's office in Iron Mountain until his retirement.

E. C. Carlson, 57, superintendent of the Anvil-Palms iron mine for Pickands, Mather & Co., died Sept. 9 at Duluth. He had been at the mine for 20 years and had been superintendent for the last 8 years.

W. A. Thomason, manager of the merchandise department of Tennessee Copper Co., Copperhill, Tenn., died Sept. 18. He was 49.

Dr. M. F. Coolbaugh, 73, former president of Colorado School of Mines, died Sept. 9 in Golden, Colo.

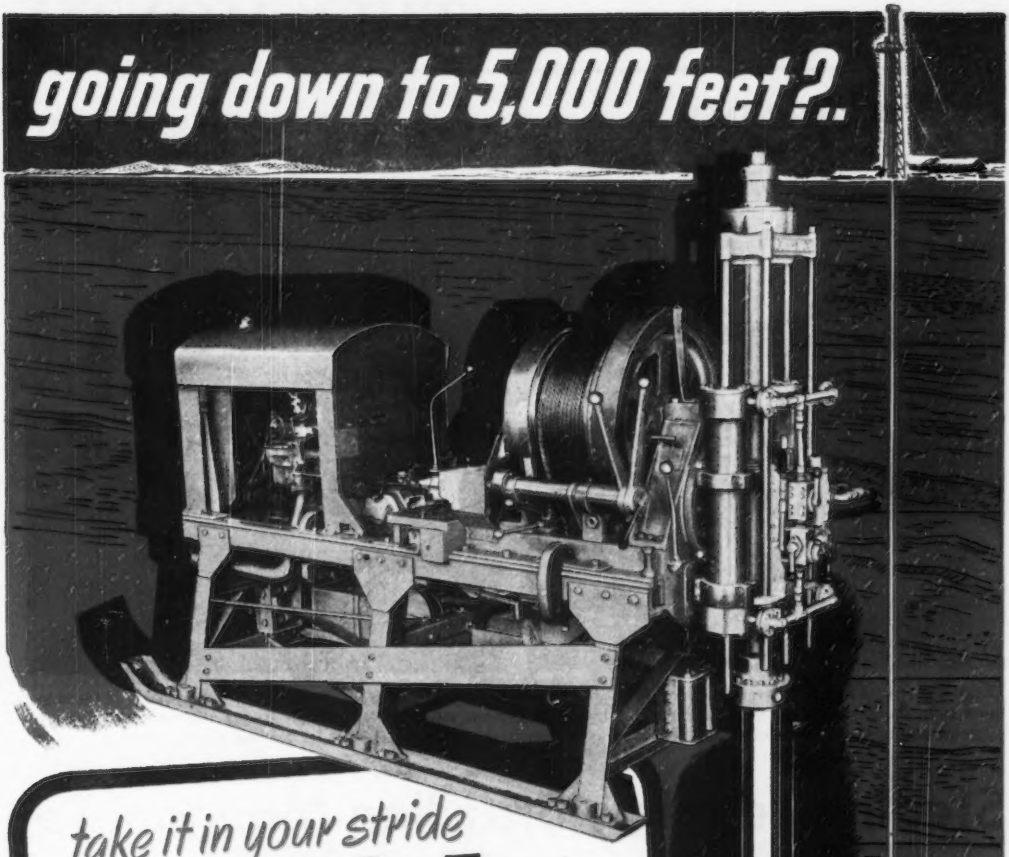
Ralph L. Carr, 63, of Denver, Colo., died Sept. 22. He had been Chamber Director since 1943 and served twice as chairman of its Natural Resources Department Committee. Mr. Carr began his career as a hardrock miner in Cripple Creek, Colo. He served two terms as Governor of the state and had been drafted by the Republican party as a candidate for Governor in the forthcoming election. He was an authority in the field of western water law and served as legal adviser to the Colorado Interstate River Commissioner and on the Rio Grande Compact.

John F. McMahon, managing director of the Industrial Hygiene Foundation at Mellon Institute, died suddenly Sept. 15. He spent his early years as a newspaperman. For two years he served as assistant to the public relations director of Columbia University. In 1936 he became a member of the Institute and six years later was appointed managing director.

Paul W. Avery, consulting metallurgist, died at Palo Alto, Calif., Sept. 27. He was a graduate of Stanford University and well-known in U. S. and Mexican mining circles. He began his professional career as assistant metallurgist for Homestake Mining Co.

August Magnuson, retired engineer of American Smelting & Refining Co. plant at Murray, Utah, died in Salt Lake City Sept. 25. He was 82.

going down to 5,000 feet?..



take it in your stride with BBS-4...

BBS-4 combines new speed, power and ease of control with traditional Boyles Bros.' dependability and rugged simplicity of design. Ideal for oil or mineral structure drilling, this recently developed surface drill is available with either 80 or 100 H.P. gasoline or diesel engine. Other features include heavy duty 5-speed transmission; optional hydraulic or combination gear and friction feed swivelheads; separate drives to hoist and swivelhead, permitting fully independent operation. BBS-4 is specially designed to take a Kelly drive for rotary drilling.

CAPACITIES:

2000 feet—6 inch hole; 5000 feet—2 $\frac{7}{8}$ inch hole. Maximum hoisting speed—850 feet per minute. Cable drum capacity—300 feet, three-quarter inch. Weight—7800 pounds.

WE LOOK INTO THE EARTH

BOYLES BROS

DRILLING COMPANY LTD.,

VANCOUVER, CANADA

OPERATION MANGANESE

TROMMEL SCREEN sorts ore from the mine at short distance from the workings. Undersize is treated immediately at plant. Oversize requires further crushing.

GANTRY CRANES stock ore nearby and load it for shipment as required. Transportation difficulties are largely responsible for holding output down.

Steelmakers Eye Brazilian Manganese

HAND METHODS in widespread use through ingenious devices like these are effective. Proposed increase in shipments will require more mechanization.

SHUT OFF FROM Russian sources of manganese, U. S. steelmakers are coming to consider Brazil as a supplier of ever increasing importance. Inadequate transportation facilities have kept shipments at the level of about 140,000 tons per year. Recent discoveries should up that figure soon.

U. S. Imports of Manganese Ore (Short Tons, Mn Content)

Source	1948	1949
Brazil	71,561	88,017
Belgian Congo	1,371	3,191
Chile	4,927	6,670
Cuba	15,931	27,313
Gold Coast	112,503	138,473
India	152,852	172,504
Mexico	23,894	23,771
Philippines	5,099	6,943
So. Africa	130,114	122,168
USSR	182,455	71,358
Totals*	702,211	664,092

*Total import figures include small tonnages from minor producing countries not listed.

IN MINING

IN THE UNITED STATES

- Page and Bunker Hill Find New Ore at Depth— p. 129
- "Carnotite Discoveries" in New Mexico— p. 135
- Garfield Refinery Starts up— p. 137

ALASKA

★High-grade ore made possible the **reopening of the Hirst-Chichagof hard-rock mine**, according to Paul M. Sorenson, general manager. Production of 50 tons daily is expected this winter.

★**A conference of 200 United States and Canadian specialists** in Alaska research is to be held in Washington, D. C., Nov. 9-10 under the auspices of the National Research Council. A. L. Anderson, Robert F. Black, Roy Earling, John Macannernny, Dr. Richard C. Ragle, B. D. Stewart and William S. Twenhoffel are among those included in the geology and geography group.

★**Alaska has been placed on a par with the United States** for a $75,000 yearly appropriation for experiment station work. Since 1936 a sliding scale has been in effect for the Territory, ranging from $5,000 to $37,500 per year.

★Ward Strauf and a partner have been operating with hand drills at their hard rock property in the Willow Creek district. Ore is carried four miles and then taken by car for milling at the Index mine. A cleanup of $10,000 was expected before the season ended.

★G. E. Martin and son have reported a cleanup of about $50,000 from 2,000 oz. of gold brought to Fairbanks during the summer from their leased property, the Hilltop mine. Work will continue as long as weather permits.

ARIZONA

★F. A. Sitton of Dove Creek, Colo., has started uranium operations on the Navajo Reservation in Northeastern Arizona. Charles H. Dunning, director of mineral resources for Arizona, said the development is the largest in the country.

More than 1,100 tons of carnotite ores were taken from the mine during preliminary operations in July. Full extent of the deposit is not known. Sitton has leased 1,280 acres in the Lakachukai basin and seven drilling crews of the Mineral Engineering Co. of Grand Junction, Colo., have moved into the area to block out deposits. Dunning estimated the ore averages about 10 lb of uranium concentrates per ton.

Sitton's property lies south of five uranium deposits producing about 400 tons of ore a day, being developed on the reservation by the Vanadium Corporation of America.

★Public health surveys of uranium mining conditions in Arizona will determine what dangers, if any, prevail for miners. Henry Doyle, U.S. Public Health Service hygiene engineer from Salt Lake City, will make the survey at Arizona's five working uranium mines. About 75 men employed at the mines will be checked for effects of ore radiation.

★George W. Campbell and son recently shipped their **18th car lot of high siliceous gold** ore from Bunker Hill mine near Salome, Ariz., to the American Smelting & Refining Co. at Hayden, Ariz. They plan to continue shipments of the ore. The mine has also proven a good scheelite producer, concentrates averaging 70% WO_3.

CALIFORNIA

★Strategic metals operations in Shasta and Inyo counties are steadily expanding, with increased activity reported in production and development.

★Anaconda Copper is milling about 125 tons of ore daily at **Darwin lead-zinc-silver mine.** Work is also reportedly accelerated at the Shoshone mine in the Tecopa district.

U. S. Vanadium Co.'s Pine Creek tungsten mine and concentrator near Bishop is being operated in volume with a daily capacity of 1,500 tons. The deposits carry good values of vanadium.

Kaiser Aluminum & Chemical Corp. has reopened its **soda ash plant** north of Cartago.

Copper and zinc is again being produced by the Afterthought mine at Ingot, and pyritic ore containing copper is being shipped by Mountain Copper Co. from its Iron Mountain mine northwest of Redding.

Johns-Manville Corp. has been exploring the Le Moine area where **discovery of a sizable asbestos deposit** has been confirmed by U. S. Bureau of Mines officials. Two diamond drill crews were reported at work on optioned property in mid-September. Chrysolite asbestos is being produced by N. J. Lockhart and associates in the Highland Lake area.

★Discovery of a **rich scheelite deposit** in the Papoose mine in Kern County by Vic De Zan and Fred Weise has been reported. Other new activity in this area includes the reopening of the Little Butte mill by Cecil Wise, Dan Shorey and Stewart Fraser. The three have leased a portion of the Yellow Aster mine and will process ores at the mill.

A new mill is being erected at the Billy Burke mine to handle gold and tungsten.

★**Mining activity is on the increase** in the historic Mariposa County area, with more than 30 lode and placer properties in operation or under development.

Extension of a tunnel to reach rich ore started recently at **Golden State Mining Co.'s Quail mine** near Red Cloud. Equipped with a ball mill of 75-ton daily capacity, the Quail is developed by two tunnels, cross-cuts and drifts.

Milling of gold ore began recently in the **Marble Springs mine** near Coulterville. Mill-grade ore is reported exposed in main workings and in an 80-ft. winze 500 ft. north of the 400-ft. shaft.

Gold quartz has been found in the **Nutmeg mine** near Midpines, reopened this year by Permit Mining Co.

★Best Mines is building a new 2,200-ft. deep level tunnel at the **Goodyear Bar district Brush Creek mine** to facilitate deeper development and allow ore to be brought to ore cars by gravity.

★**Sarita Milling Co.** has installed a

(*Continued on page* 128)

in every construction drilling operation . . .

CRUCIBLE HOLLOW DRILL STEEL *cuts costs*

In mines and quarries, roads and tunnels Crucible Hollow Drill Steel is giving users *lower cost per foot drilled.* Controlled hardenability, excellence of stress-bearing surfaces and uniform processing all contribute to the assurance that Crucible Hollow Drill Steel will cut costs in your drilling operation.

To make these economies more than just a promise . . . *every lot* of Crucible Hollow Drill Steel is *pretested.* Crucible's drilling tests *before* the steel is shipped is another reason why you can count on Crucible to deliver the drill steel you need to keep your costs down!

So, when you ask for CRUCIBLE, you know that lot after lot is produced to chemical uniformity—proven by performance under field conditions. What's more you get fast field service, alert metallurgical advice, countrywide stocks. Check our local representative, he can help you. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

HOLLOW DRILL STEEL

HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

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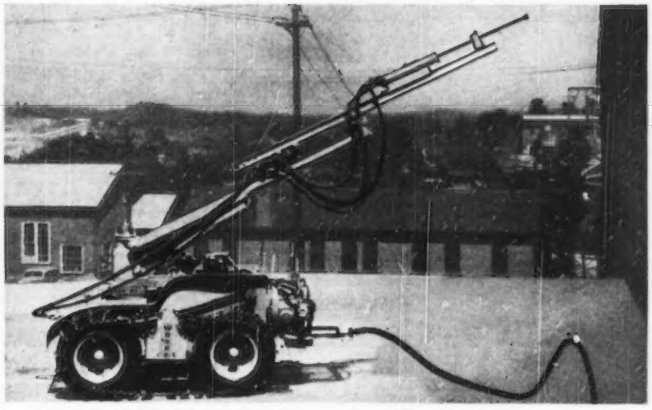
NEW PRODUCTS DIGEST

For further information on these products, circle item numbers on card—insert and mail.

PREVIEW

This Jumbo Climbs in the Stopes



CHAINS to help jumbo climb steep grades, and a boom that . . .

. . . SWINGS 360°, may make this jumbo a 50% time saver

CLIMBING A 15 TO 20% GRADE to drill the breast of a stope is asking a lot of a jumbo, but the Mascot mine in Tennessee has an experimental machine that will do just that.

"The secret," says General Superintendent H. A. Coy, the designer, "lies in the use of chains on the rubber tires." If the machine (trade-named Coy Hobo) lives up to estimates based on recent tests, it should save the miner 50% of his time.

Rugged, all-welded chains loop over the two wheels on each side like the treads of a tractor. The chain permits climbing a pile of loose rock where tractor treads or rubber tires alone have been found to slip excessively. Under the body of the machine there is a clearance of 14 in. so that most boulders lying in its path are no obstacle.

Two 15-hp. Joy air engines power the Coy Hobo. Each engine chain-drives a pair of wheels on one side so that steering is similar to that of a tractor.

The drill is mounted on a Joy jib and the boom can swing through a full 360°. The operator can put in holes at the floor level and up to a height of 15 ft. Mr. Coy states, however, that details of drilling practice will have to be worked out as experience is gained with the new unit.

P. S. The Coy Hobo is NOT available for purchase at this time. This preview is part of a policy to get E&MJ readers in on the ground floor of promising new developments. We'll keep you posted on the performance of the Hobo.

15 Years
..one BLOCK

A RECORD IN SLUSHER MINING

Installed in 1933 this Skookum Heavy Slusher Block was soon forgotten—forgotten because it performed its job perfectly for 15 years.

Attention was called to this Skookum Block only when it was noticed that there was less wear on the wire rope being used.

An extremely wide sheave and throat allows passage of a square knot in 1⅛-in. wire rope, especially designed to prevent wear.

- **Manganese steel sheaves,**
- **Annealed cast steel sides,**
- **Timken bearings and Skookum patented grease retainers are responsible for 15 years of economical, trouble-free performance.**

OTHER MINING STOCKS

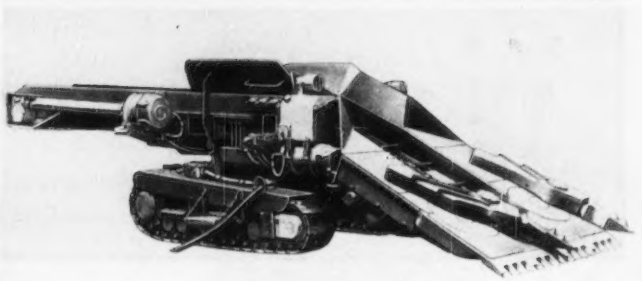
Skookum slusher dragline blocks with alloy tool steel swivel crosshead. **T-8**

80 Skookum Guide Block. Used in conjunction with slusher blocks. Carries slack.

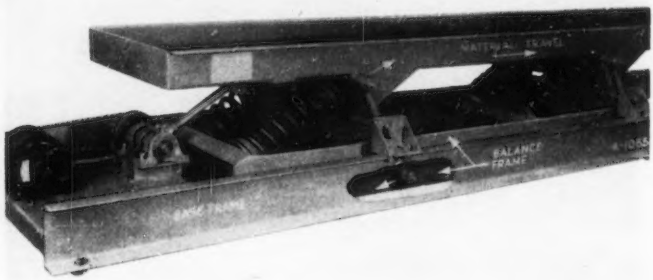
Specify SKOOKUM when choosing blocks

SKOOKUM CO., INC.

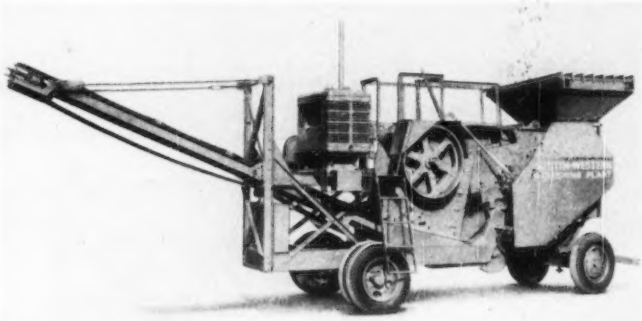
8504 N. Crawford Portland 3, Ore.



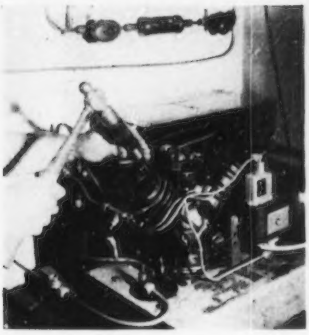
LOADER high-speed, continuous-type, designed for metal and non-metallic mines, is operated by only one man. The 18-HR-2 can be used at draw holes, in drifts and flat-bedded deposits. Main electric motor is 75 hp. Conveyor is driven by two 7½ or two 10-hp. motors, depending on material. All materials are hydraulically controlled. Joy Mfg. Co., Pittsburgh, Pa. (2)



VIBRATING CONVEYOR is designed for use where vibration transmitted to supporting structures is a problem. Natural Frequency conveyor handles practically any material, boxed or bulk. Comes in 10-ft. sections. Capacity is varied by specifying width, material depth. Open or enclosed, it can be used for heating, cooling, scalping, too. Stephens-Adamson Mfg. Co., Aurora. (3)

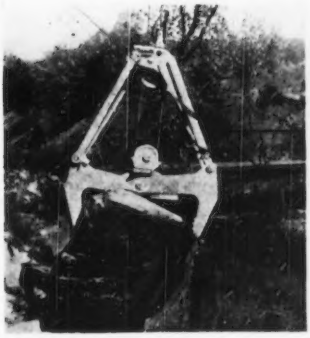


PORTABLE CRUSHING, screening plant is designed for fast, economical production where extreme accuracy in grading to size is not required. Compact and lightweight, the portable "61" can easily be moved to any location to simplify hauling problems. Design is simple with stress on sturdiness. Austin-Western Co., Aurora, Ill. (4)



IMPAKDRIVER easily tightens or loosens nuts, screws, bolts. Just twist in desired direction and rap with hammer. Impact is translated into torque. H. K. Porter, Inc. (5)

CRUSHER is impact type. Handles from 60 to 250 tons per hr., 30x30 in. maximum feed size. Adjustable breaker bars control product size. Jeffrey Mfg. Co., Columbus, O. (6)



STONE GRAB bites extra hard, picks up 5-ton, odd shaped rocks with maximum 54-in. spread. Uses ⅝ or ¾-in. cable, weighs 2200 lb. Wellman Engineering Co., Cleveland. (7)

at the working face . . .

GIVE 'EM AIR

Mr. Safety Engineer...

at the lowest possible cost!

Above ground it's free, but down in the bowels of the earth, where men mine the pay-lode or build tunnels for the benefit of humanity, *AIR* and its *DELIVERY COST* are vital factors.

SPIRATUBE-M and AYRTUBE cut Air *Delivery Costs.* Made specifically for mine and tunnel ventilation, these two new *AIRDUCTS* working individually or in combination, deliver a maximum cubic measure of air right at the working face and at the lowest possible cost—because—ease of handling reduces installation costs, and construction features minimize leaks and seepage. You get the full volume created by your fans and blower units right where you need it—at the working face—reducing power costs.

Immediately available in tough high count jute and other fabrics, all specially treated and heavily coated inside and out to withstand fungus and mildew and rough usage.

Extremely flexible special (patented) built-in couplings eliminate fabric mangling—parts are never laying about to create accident hazards.

SPIRATUBE-M and AYRTUBE save labor—cut fatigue—step up output—cut maintenance costs.

SPIRATUBE-M — (DIAMETERS to 30 INCHES) Especially designed for both positive and negative pressure, or reversible systems. Replaces rigid ducts. Offers great savings in shipping, installation, maintenance, and storage costs. Patented concealed spring wire construction springs to work and stays extended. Built-in quick couplings with joints lock ringed against blast concussion. No fittings required for turns or bends.

AYRTUBE — (DIAMETERS to 36 INCHES) Heavy duty pressure ventilation tubing without wire reinforcement. Quick coupling ends and lock rings interchangeable with SPIRATUBE-M. Materials and constructions meet Flexible Tubing Standards. Full line of special fittings available.

Flexible Tubing Corporation, Branford, Conn.—Dept. 149A

Send us more information. Spiratube-M ☐ Ayrtube ☐

FLEXIBLE TUBING CORPORATION — SPIRATUBE — BRANFORD CONNECTICUT U.S.A.

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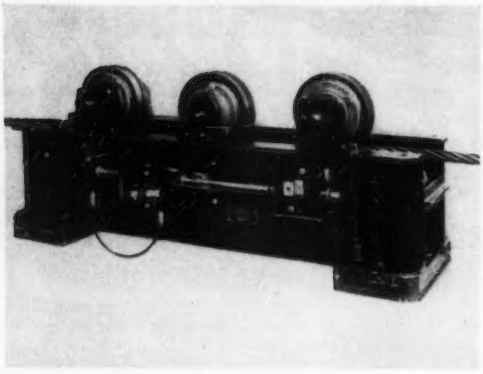
Title.....

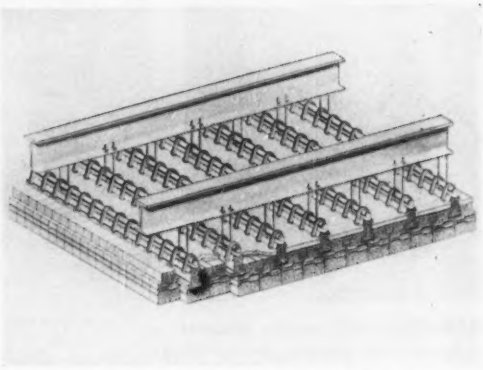
Company.....

Address.....

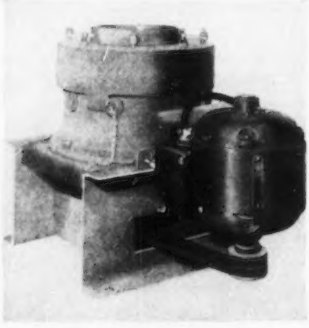
5-K-12 City.....Zone....State.....



MICRO-TENSIOMETER records stresses on hoisting ropes while operating. Lets you know the magnitude of dangerous instantaneous shock loadings, preventing undue wear. British Ropes Ltd., Doncaster, England. (8)



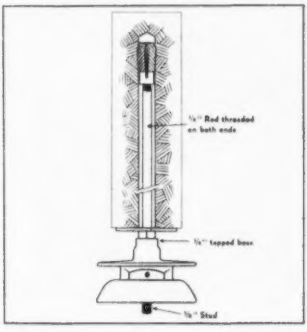
REFRACTORY ARCH features double hung units suspended from overhead. Freedom of movement reduces spalling to a minimum. Units are self aligning, parts standardized. Geo. P. Reintjes Co., Kansas City, Mo. (9)



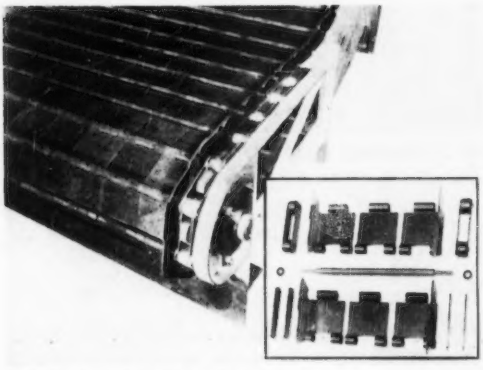
REDUCTION CRUSHER for lab or pilot plant can reduce ½-in. feed to as fine as 10 mesh in one pass. Sizes are 6 and 10 in. Mine & Smelter Supply Co., Denver, Colo. (10)

If There's Anything Else You Want to Know...

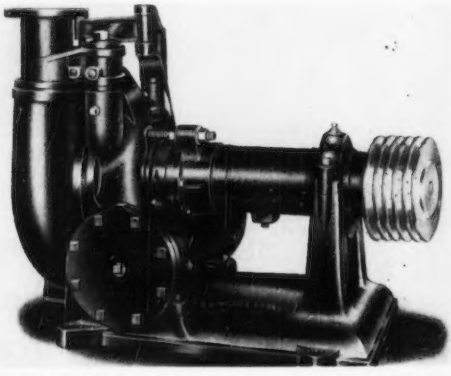
about any of the products on this and other pages of the New Products Digest, just circle the item's number (found in parentheses at the end of the caption) on the postage-free reply card opposite this page. Mail as soon as possible.



MINE HANGER can be attached directly to protruding ends of roof support threaded rods after they are installed as usual. Ohio Brass Co., Mansfield, O. (11)



STEEL CONVEYOR BELTING handles hot or abrasive parts or scrap, wet and dry chips, flash, etc. Links will form belt almost any length, 6 in. to 6 ft. wide. Can be perforated for coolants. May-Fran Engineering, Inc. (12)



SAND PUMP has discharge keeper which registers on machine surfaces, providing accurate piping alignment. This supports piping while removing pump parts so discharge needn't be disturbed. A. R. Wilfley & Sons, Inc. (13)

Equipment Shorts

FLOW CONTROLLER. High accuracy, fast response and low maintenance costs are emphasized by the manufacturer of this automatic flow controller. It utilizes a frictionless magnetic coupling between the float and the pen and control mechanism. Bulletin 950 gives more information. Penn Industrial Instrument Corp., Philadelphia, Pa. (31)

WHEEL DRESSERS. Diamond impregnated carbide wheel dressers, using a number of small, inexpensive diamonds imbedded in a special carbide matrix instead of a single costly diamond fitted into a steel holder, are able to effect import savings in wheel dressing costs. Carboloy Co., Inc., Detroit, Mich. (32)

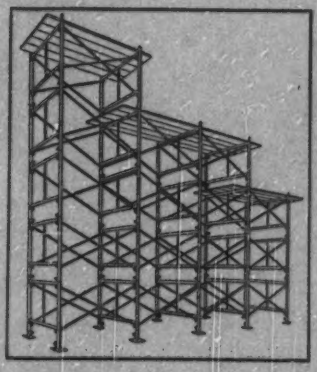
TOURNAROCKER. New model rear dump hauling unit—the E-9 Tournarocker—is designed for loading by shovel, dragline or backhoe. Heaped capacity is 9 tons or 10 cu. yd. and height is 7 ft. R. G. LaTourneau, Inc., Peoria, Ill. (33)

DIESEL LOCOMOTIVE. Diesel trammer is narrow enough to work in small drifts and low enough to go under chutes. The 10-hp. diesel engine, working through a fluid coupling, furnishes a drawbar pull of 800 ft. Ruth Co., Denver, Colo. (34)

SUBMERSIBLE PUMPS. Pump and motor are assembled as a unit to operate completely submerged in water. Just lower pump on its riser pipe to proper depth and connect submarine cable to power supply. Sizes range from 0.7 to 60 hp. with capacities from 5 to 1,250 gpm. Sumo Pumps, Stamford, Conn. (35)

ASSAY FURNACE. Uniform accuracy, economical operation and cleanliness are reported advantages of this electric assay furnace. A centrifugal type electric exhaust blower draws air into the heating chamber and carries off fumes. The furnace reaches a fusing temperature of 2,000° F. in about 2 hours, using a maximum of 25 kw. Normal temperatures require 12 to 15 kw. Chamber of Model AF-320 is 17 in. wide, 25 in. long and 7¾ in. high. Pereny Equipment Co., Columbus, Ohio. (36)

SPOT WELDER. Increased power, faster welding, easier handling, automatic switch control and greater versatility are proclaimed by the maker as the standard features of this self-contained portable spot welder (Model 13W). Although the tool weighs only 33 lb. it can weld up to ¼ in. combined thickness of mild or stainless steel, or 2 pieces of 16-gage galvanized metal with a combined thickness of ⅛ in. Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y. (37)



TUBULAR SCAFFOLDING. Low cost, easy-to-erect scaffolding uses a patented cam lock to permit fast construction and versatility. This handy staging should find lots of use around mine and plant. You can find out all about it in Folder A6 of the Advanced Scaffold Div., Ellwood City, Pa. (44)

U-SHAPED BULLDOZER. Large capacity, U-shaped bulldozer permits long-haul pushing of loose material with minimum end spillage. Model No. 8U is cable-controlled, has cutting width of almost 12 ft. and is 45¼ in. high. Caterpillar Tractor Co. (38)

VIBROMETER. Be your own vibration expert. The Davey Vibrometer Model P measures amplitude of machine vibrations when you hold it against the machine. A detachable probe, 8 in. long, can take measurements on a rotating shaft and in hot or inaccessible places. Two models magnify vibratory motion 250 and 125 times respectively. Vibroscope Co., New York, N. Y. (39)

FIRE NOZZLE. Half turn of this fire nozzle gives a full fog. Two more turns give straight solid stream. The Bete G-5 nozzle operates on any pressure from 30 to 150 psi. with about 8 gpm. fog or 10 gpm. straight stream. Unit is self-cleaning, non-clogging. Bete Fog Nozzle, Inc., Greenfield, Mass. (40)

JEEP-MOUNTED DRILL. Added mobility in drilling results from mounting a drill on a 7 ft. 4 in. tower at the rear end of the Universal Jeep. The drill obtains power from the rear power take-off and the Jeep's hydraulic system raises and lowers the drill boom. The equipment can drill a 4-in. hole, 100 ft. deep, either vertically or horizontally. Willys-Overland Motors, Inc., Toledo, Ohio. (41)

CONVEYOR REPAIR. Any workman can apply Magic-Vulc anti-abrasion plastic rubber compounds for protecting and repairing worn conveyor belts. Trial units available. Magic Chemical Co., Brockton, Mass. (42)

TEFLON PACKING. V-type packings combine the chemically inert and frictionless properties of Teflon with the resilience and toughness needed for proper sealing results. Cross-section design insures permanent sealing even under varying pressures at temperatures up to 450° F. Crane Packing Co., Chicago, Ill. (43)

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Not good after Feb. 1, 1951, if mailed in U. S. or Canada.

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Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	31	38	45	71	78	85
2	9	16	32	39	46	72	79	86
3	10	17	33	40	47	73	80	87
4	11	18	34	41	48	74	81	88
5	12	19	35	42	49	75	82	89
6	13	20	36	43	50	76	83	90
7	14	21	37	44	51	77	84	91

My Name ..... Position .....

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For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

STEEL DERRICKS. All the details from boom point to sill are given on 6 different types of derricks with capacities of up to 250 tons, in the 36-page Bulletin 200-D-3 issued by American Hoist & Derrick Co., St. Paul, Minn. (71)

D. C. MOTORS. Users of d.c. electric motors from ¾ to 1,000 hp., are offered a fully illustrated 12-page bulletin published by Relisnce Electric & Engineering Co. Designing, construction, selection and ordering information are featured for the Type "T" heavy-duty, constant and adjustable speed motors. (72)

RUST PREVENTION. Easily understood directions for preventing rust under general exposure and special conditions may help you keep your machinery finishes, heat resistant and chemical resistant and floor coatings in better condition, are outlined in this catalog issued by Rust-Oleum Corp., Evanston, Ill. Included are 36 different kinds of service and application, and 70 colors are reproduced with complete specifications as to properties and specific uses. (73)

HARD-SURFACING. Hundreds of hard-surfacing applications and description of welding rods recommended for each, are covered in this bulletin put out by Sight Feed Generator Co. You will also find technical data on the running of hardfacing electrodes and hints about welding on manganese. (74)

RECORDING GAGES. All you want to know about Bristol Co.'s (Waterbury, Conn.) pressure gages from 0 to 10,000 psi., vacuum gages, low-range draft and pressure gages, barometers and absolute pressure gages for ranges as low as 0 to 6 mm. of mercury. Measuring elements, operating principles and accessories are fully described. Automatic controlling and telemetering of pressure values are discussed. (75)

SCREENS. Wet or dry separation of crushed rock or practically any other kind of material by Gyrocentric screens is covered in a 24-page brochure published by Patterson Foundry & Machine Co., East Liverpool, Ohio. Packed full of installation photographs, specifications drawings and detailed information. (76)

SPEED REDUCERS. Here are 4 catalogs (which makes it this month's bargain) on speed reducers variously classified as (1) parallel shaft sleeve bearings, (2) parallel shaft roller bearings, (3) horizontal right angle, and (4) vertical right angle. All these Falk Corp. (Milwaukee, Wis.) bulletins cover methods of selection, horsepower rating tables, torque capacity tables, order guides and dimensions. (77)

TRACTOR. Here's where you find out all about Allis-Chalmers' huge HD-19 crawler tractor and its torque converter drive. There are 24 pages full of cutaway views, specifications, engineering data as well as clear explanations of how the torque converter and various parts of the diesel engine work. (79)

NUCLEAR INSTRUMENTS. A whole series of instruments for measuring radioactivity, from 4-lb. Geiger counter to sizeable laboratory installations, are described in the 40-page catalog put out by Nuclear Instrument and Chemical Corp., Chicago, Ill. (81)

VIBRATING FEEDER. The Vibra-Feeder employs mechanical rather than electro-magnetic means of operation. It's claimed that this eliminates many parts, cuts maintenance costs. The unit is fully described in Bulletin 134 of Hewitt-Robins, Inc. (82)

VIBRATING CONVEYOR. Hewitt-Robins also puts out Bulletin 135 which gives you the pitch on their Vibra-Veyor and its balanced mechanical action without counterweights. Unique feature claimed for the unit is that one vibrator can do the work for up to 200 ft. (83)

JEFFREY PRODUCTS. A leading manufacturer of mining equipment shows his wares in a 48-page booklet entitled, "What We Make." Jeffrey Mfg. Co. (84)

FLOTATION REAGENTS. "Current Reagent Practice on Copper Ores," published by American Cyanamid Co., N. Y., gives you 18 examples of treating many copper-bearing ores. (85)

MAGNETIC SEPARATORS. Condensed 4-page catalog (No. 350) illustrates and describes the use and operation of magnetic drums in addition to giving capacities, weights and dimensions. Issued by Magnetic Engineering & Mfg. Co., Clifton, N. J. (86)

CORROSION PROOF CEMENTS. A complete line of resin, sulphur, silicate and asphaltic cements are described in Bulletin 5-1 issued by Atlas Mineral Products Co., Mertztown, Pa. Included is information on Alkor 5E which the manufacturer claims to be the nearest thing to a universal corrosion resitant cement. (88)

WIRED TELEVISION. If the job is . . . too dangerous . . . too hot . . . too difficult . . . too cold . . . too expensive . . . too high . . . too inaccessible . . . too low . . . too tiring . . . too dark . . . too far . . . too small . . . to observe directly, try the Utiliscope. This bulletin shows you more than 30 ways in which you may be able to use wired television to watch work or a process from a distance. (89)

REAR DUMP TRUCK. Here are 8 pages of description, illustrations and specifications on Model 1UD Rear Dump Euclid. This smallest of Euclid's off-the-highway trucks has a payload capacity of 10 tons, and uses a 125-hp. diesel engine. Euclid Road Machinery Co., Cleveland, Ohio. (90)

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to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

FIRST SHEET from Canada's first stainless steel sheet mill is handed over to R. H. Davis, president, Atlas Steels Ltd., as plant starts operation.

Memos from the Manufacturers

- **Minnesota Mining & Mfg. Co. and Pacific Rubber Co.** as associates have been awarded a contract to **reactivate and operate a $22-million Government-owned synthetic rubber plant** at Torrence, Calif.
- **Largest single expansion in Cummins Engine Co.'s** 30-year history is slated to begin immediately with the construction of a new building that will give them 92,000 sq. ft. of floor space.
- **Open house** at its Indiana Harbor plants was recently held to celebrate Youngstown Sheet and Tube Co.'s 50th anniversary.
- **Is this a trend?** General Electric Co. is the latest to announce opening of a sales office in Washington, D. C.

John Lundahl has been appointed to the newly created position of sales representative-at-large by the Detroit diesel engine division, **General Motors Corp.** He will work with regularly assigned sales representatives throughout the country.

Special representative in engine application for the eastern sales division of **Caterpillar Tractor Co.** is **D. G. Blattner.** His territory includes New York, New Jersey, East Pennsylvania and Connecticut.

W. B. Bowie, who retired Aug. 31 as manager of engineering sales of the **Electric Storage Battery Co.,** is succeeded by **Ross R. Moore. Thomas H. Dooling,** Pacific Coast manager, has been appointed Western States Manager with his territory expanded to include the Denver branch. **James G. Bouska** was named manager of the Denver branch.

The appointment of **E. E. Bauer** as contract engineer for **Heyl & Patterson, Inc.,** has been announced. He will serve the steel and utility market in the western territory.

The Foxboro Co. announces the opening of a branch office at 214 W. 10th St., Wilmington, Del., under the managership of **Kenneth L. Barton.** Another company office was opened at 225 S. 5th St., Minneapolis, Minn., recently with **Robert C. Cahill** as resident engineer.

Edward Daley, formerly San Francisco district manager for the Marion Power & Shovel Co., has been appointed assistant regional manager for **Cummins Engine Co.,** with headquarters in Los Angeles. As assistant to **A. S. Leonard,** regional manager, he will contact customers in the Southwest territory.

Robert P. Desch has joined **Atlas Mineral Products Co.** as a research chemist.

S. S. Stewart, formerly purchasing agent for the manufacturing division of Air Reduction Sales Co., has been named vice president in charge of purchasing for **Mack Manufacturing Corp.**

The new post of assistant divisional manager of the Export Sales Dept., **Caterpillar Tractor Co.** has been assigned to **Oscar von Seeger,** export representative for the company since 1946.

Recently appointed sales representative for **Marion Power Shovel Co.** in northeastern Ohio, part of Pennsylvania and a section of northwestern New York State is **Charles K. Essex.**

Formerly plant engineer at the Mertztown plant of the **Atlas Mineral Products Co., George Gabriel** has been promoted to assistant plant manager.

Raybestos-Manhattan, Inc.'s Manhattan Rubber Div., has appointed **P. L. Edwards** as manager of its Central District office, Pittsburgh. He succeeds **R. C. Rice,** retired.

Assistant comptroller **W. H. Schneider** has been elected vice president-comptroller of **Mack Trucks, Inc.,** to succeed **J. E. Savacool,** who is retiring.

W. W. Sly Manufacturing Co., Cleveland, Ohio, has appointed the **Horrell Co.,** Los Angeles, consulting engineers and distributors of engineered products and equipment, as sales engineers for the Sly line of industrial dust control and sandblast equipment.

Cecil Thomas Dykes is now representative in the Texas territory for the **D-A Lubricant Co., Inc.,** of Indianapolis. He succeeds the late L. G. Washburn.

Promotions in the manufacturing dept. of **Caterpillar Tractor Co.** include **J. R. Munro** to the newly-created position of director of manufacturing, **C. A. Woodley** to general factory manager, **W. L. Naumann** and **Lloyd J. Ely,** assistant general managers.

Appointment of **Chester R. Austin** as manager of the development section of the research department of **Koppers Co., Inc.,** has been announced.

American Brake Shoe Co. has announced the following appointments: **Fred P. Biggs,** president of the Brake Shoe & Castings Div.; **Stephen S. Conway,** vice president in charge of sales, Brake Shoe & Castings and Southern Wheel Div.

First vice president **Maurice N. Trainer** was elected president of **American Brake Shoe Co.** on Sept. 13. **William B. Given, Jr.,** president for 21 years, was elected chairman of the board.

Burton C. Sears has been appointed assistant regional manager for the southeastern region for **Cummins Engine Co., Inc.** His headquarters are in Atlanta, Ga.

What They Said:—

at International Mining Days Celebration El Paso, Texas; October 12, 13, 14

Dr. Donald H. McLaughlin, president, AIME. (On strategic minerals.)

"I am much opposed to subsidies or any other Government aids that give the Government control over the individual miner, but there can be no marginal production without some aid."

Dr. Eugene Calaghan, director, New Mexico Bureau of Mines and Mineral Resources. (On perlite.)

Large portions of otherwise commercial deposits are valueless if the perlite is crystalline in form instead of amorphous.

Donn M. Clippinger, raw materials engineer, New Mexico Bureau of Mines and Mineral Resources. (On clays in New Mexico.)

First step toward expansion of New Mexico's clay industry would be an inventory of clays and their commercial value. There is a good chance for a pottery industry if the art of Pueblo Indians can be combined with modern techniques of fabrication.

Dr. D. M. Wiggins, president, Texas Technical College. (On the state of the nation.)

"There is no use crying out against certain individuals. The sin rests with us who elect these individuals to office."

George T. Harley, manager, Potash Div., International Minerals & Chemical Corp. (On shaft sinking through pre-grouted ground.)

Cost of pre-grouting is about $75,000 to $90,000 per shaft as compared with $500,000 for freezing methods. A grouting technique is replacing roof bolting in some coal mines.

A. W. Knoerr, associate editor, Engineering & Mining Journal. (On keeping up with technical developments in mining.)

"We should make it a point to read systematically and act on the wealth of technical literature being made available to the mining industry by the AIME, U. S. Bureau of Mines, various mining organizations and contemporary foreign and domestic mining publications."

California *(Continued)*

larger ore crusher at its new mill and is treating 100 tons of ore daily, according to reports.

★The rehabilitated Providence mine near Tuolumne City has been opened by the **Providence Tuolumne Gold Mines, Inc.,** and is being worked with a 30-man crew through a tunnel about a mile long. Ore is hauled by an electric locomotive from the 600-ft. level to the mill, which has a capacity of 150 tons daily. Concentrates are shipped to a custom smelter.

★**Central Eureka Mining Co.** has announced formation of a subsidiary, Central Mercantile Co., which will handle building materials, industrial rubber goods, wire rope and lumber. J. D. SWIFT, president, said that establishment of a supply firm was part of a policy to diversify efforts and assure a source of supply materials.

COLORADO

★**An important silver, lead and zinc discovery** in the Georgetown area has been reported of the Terrible mine near Silver Plume. Gold Mines Consolidated, Inc., operators of the mine, reported the discovery.

★**At Cripple Creek,** a lease from the Stratton Cripple Creek Mining & Development Co. on the Proper mine and the Chicago and Cripple Creek tunnel, to the Globe Hill Mining Co. has been secured by Al Konselman. Considerable prospecting work is now underway. All operations are being carried on through the Chicago tunnel and the present objective is to raise from the tunnel level to connect with the stopes on the Proper property.

★**Three prospectors have discovered uranium ore** near Pagosa Springs. According to the first information available, the ore contained 1.4% U_3O_8. Five claims have been located, in the Blanco Basin. This strike is the first made of uranium in that section.

★Rocky Mountain Diamond Drilling Co. of Tracy, Calif., has **leased three of the Alma Syndicate claims** in Mineral Park on Mt. Bross, near Alma. The Alma Syndicate shaft and workings are being unwatered. A program of exploration and development is planned in the hope that a body of lead-zinc-silver ore will be opened.

★Walter E. Scott, Jr., Commissioner of Mines has mailed notices that the **Colorado law requires inspection of all mines, quarries, plants and oil wells.** The law further provides that all operators of mines, quarries, clay pits, plants, drilling and producing oil wells, shall notify the Bureau of Mines or the mine inspector of their districts, when work is started on any property, and again when work is stopped. All accidents must be reported to the Bureau in writing, but fatal accidents must be reported immediately by telephone or telegraph. Copies of "Mining Laws of Colorado," with oil well law included, may be obtained by writing the Commissioner.

★**Atomic Energy Commission has signed a $17,000 contract** with Consolidated Caribou Silver Mines, Inc., for underground exploration work in the company's Caribou mine in the Colorado Front Range near Nederland, Colo. AEC contracted the work to assure obtaining data of geologic value for use in studying the Front Range, which has long shown evidences of uranium mineralization, and also to gain more conclusive information on the potentialities of the Caribou mine. Underground exploration under the contract is to be completed by Nov. 30.

★The Elk Basin Co., Ltd., has **leased the Connors mine** at Kokomo. The old tunnel is being opened and three shifts are working. Placer operations are underway up French Gulch out of Breckenridge a few miles.

★Seven hundred and fifty tons of screened dumps **ore from the Stevens mine** near Georgetown was recently milled at the Black Eagle mill, resulting in approximately 25 tons of lead concentrates, which is estimated will go 50% lead, from 80 to 100 oz. silver, nearly 1 oz. gold, and from 6% to 8% copper. In addition, there were approximately 25 tons of zinc concentrates, which it is believed will run about 50% zinc.

★Reports from the San Miguel region state that **miners have found new uranium occurrences near Placerville.** The widest streak exposed is 18 in. and it occurs as a fissure vein. Ore minerals are white-gray-black in color and fairly soft. Assays of samples run from 1 to 8% U_3O_8.

IDAHO

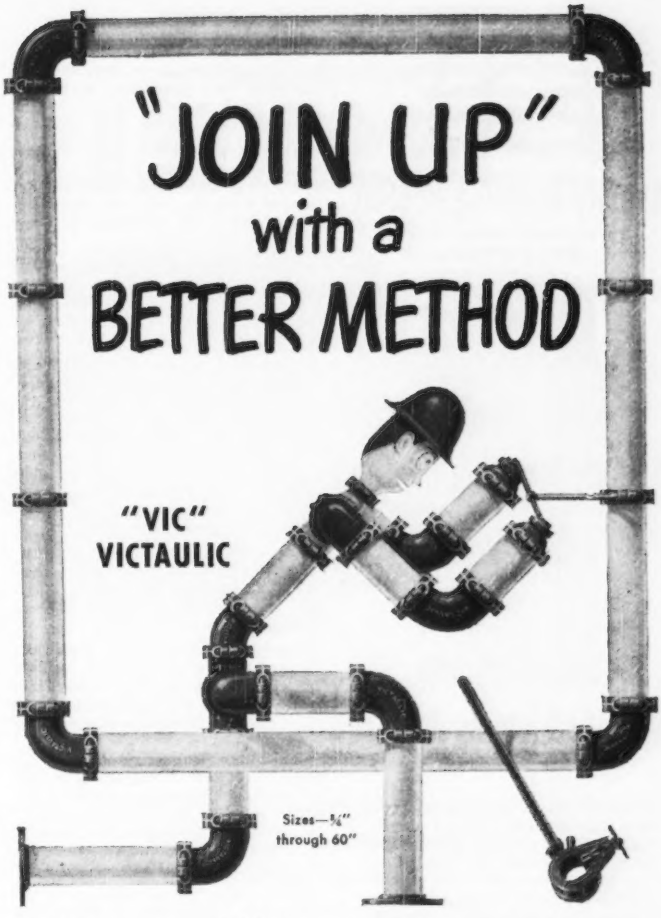
★**Bunker Hill & Sullivan Mining & Concentrating Co.** at Kellogg has developed a new vein of silver-lead ore of major proportions at depth. It is called the Truman vein and was first discovered in 1942 on the 2,200-ft. level, according to J. B. Haffner, general manager. Since that time the vein has been developed for more than a length of 600 ft. and from the 2,200 to the 1,900-ft. level. Mr. Haffner says the vein will average 12 to 15 ft. in width and assays on an average of 8% lead and 5 oz. silver per ton. Recent developments on the 1,700-ft. level have revealed an orebody which is said to be the highest average grade ever found in the mine. The crosscut work has penetrated to orebody a distance of 30 ft. and diamond drilling indicates the mineralized zone is about 100 ft. wide. This discovery is in between the Cate and Dull faults in the same territory in which the Truman vein occurs in lower levels and may prove to be the upper part of the Truman vein.

Bunker Hill is planning a new 3-compartment vertical shaft in the northwest portion of the mine to be used exclusively for hoisting and lowering men and supplies, leaving the present incline shaft for tonnage production.

★**Golconda Lead Mines Co.** has opened its orebody on the 1,150-ft. level, 150 ft. below the discovery tunnel. The ore has a strong "rake" to the east and it was decided to sink an incline shaft following the ore as nearly as possible. On the 150-ft. level the ore left the shaft and a drift on the vein was started east. So far this drift has developed high-grade galena ore for a distance of 100 ft. and indications are that the orebody will be as long as on the discovery level, which was 300 ft. The vein extends easterly into Square Deal company ground, in which Golconda owns a large interest. Drifting into the Square Deal on the 1,000-ft. level has opened another ore shoot 150 ft. long while drifting continues to show scattered bunches of ore. The company is now milling 1,200 tons of development ore from the 1,150-ft. level.

★Metropolitan Mining Co.'s 16% interest in Sunshine's Yankee Girl vein netted the company $8,886.84 in August, during which month 1,200 tons of ore was milled. Metropolitan is paying half of the development expense of driving a crosscut south through Metropolitan ground from the 3,100-ft. Sunshine level. Sunshine owns a 50% interest in the undertaking.

★**East Lemhi Mining Co.** has been organized in Spokane to take over the Kimmel and Leadville mines near Leadore, Idaho. Both mines were productive in the early days and are reported to contain large tonnages of low-grade milling ore which it was



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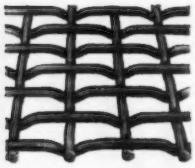

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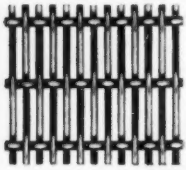

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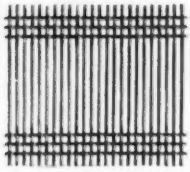

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A CENTURY OF CONFIDENCE

Idaho *(Continued)*

not profitable to mine at that time. J. F. Arnold, manager, says the new company has purchased a milling plant which is being moved to the Leadore site.

★Elkhorn Mining Co. near Boulder, Mont., reports that a new crosscut in its Free Enterprise claim has developed 1,200 oz. silver ore which carries 18.78% U_3O_8, according to Wade V. Lewis, president.

★**Bismarck Mining Co.** is prospecting mineral structures along the line of the Big Creek fault by tunneling on the west fork of Big Creek south of the Sunshine and Metropolitan mines.

★Mines in the Coeur d'Alene district are **advertising for experienced hard-rock miners.** Since the start of the Korean war increasing numbers of miners are leaving the district to look for industrial jobs on the Pacific coast. The Idaho employment service office in Wallace reports a shortage of nearly 500 men in the district.

★**Silver Bowl Mining Co.,** operating the old Senator Stewart mine at Kellog, has leased the Amy mill on Pine Creek and is milling 5,000 to 6,000 tons of low-grade ore stockpiled from development work activities.

★**Sunshine Mining Co.** has opened the Chester vein on the 3,400-ft. level in the north-south section of the vein in the Rotbart area, operated jointly by Sunshine, Polaris and Silver Dollar Mining companies.

Sunshine's August production totaled 20,124 tons of ore, which included ore from all vein systems in operation, but a continued shortage of miners makes it impossible for the mine to reach its maximum production capacity.

★**Ione Mining Co.** of Murray reports cutting a 12-ft. vein of silver-lead ore in a crosscut being driven to open the company's Ione vein. The discovery is 100 ft. from the estimated downward extension of the Ione.

★Operation of a bucketline dredge on Big Creek, south of Cascade in Valley County was to be started in October, according to Fred Baumhoff, owner. It will recover monazite sand, with its content of thorium and gold. The dredge will handle about 5,000 to 6,000 yd. of gravel daily, Mr. Baumhoff said. A crew of 15 to 20 men will be required to keep the electrically-powered dredge in operation around the clock.

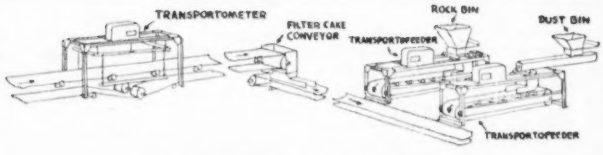
★The Bradley Mining Co. of San Francisco has announced that it is reactivating its tungsten production at the Yellow Pine mine at Stibnite, Idaho, and is striving to meet "heavy" demands for antimony metal and oxide.

John D. Bradley, vice president in charge of Idaho operations, said that the demand for antimony products has become heavy in the last three weeks and "will get heavier still." The company normally produces about 95% of the nation's domestic primary antimony.

During World War II, the Yellow Pine mine at Stibnite turned out 40% of the country's domestic tungsten, but its high-grade deposits of the metal were exhausted, and the company turned to production of antimony. An electric antimony smelter was built at Stibnite at a cost in excess of $1,500,000, and this giant furnace has been in the process of testing and perfecting for the last year. It is now capable of producing about 6,000 tons of antimony per year, Bradley said.

Now, he added, the company is reactivating tungsten production by putting in a new plant for treating low-grade ores. Mexican mine production has dropped off, he said, and the big source of antimony and tungsten prior to World War II was China. Since that supply is now choked off, the importance of domestic production of the strategic metals has been magnified.

★The State of Idaho Land Board has **denied an application to dredge** the



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bed of the Salmon River in Stanley Basin, after receiving numerous protests from civic and sportsmen's groups. The State Fish and Game Commission joined in the protest, claiming the area would be spoiled for reclamation.

The application was submitted by Kate Finch of Fairfield. She sought to dredge on land under state supervision near Clayton. State Land Commissioner Edward Woozley said that while other dredges are operating in the basin, they are not on state land or land under state jurisdiction.

★Norman Smith, directing engineer of the Clayton Silver Mines operation in the Bayhorse district of Custer County, reports the company's 100-ton flotation mill is running around the clock, treating about 2,500 tons of ore and turning out about three cars of lead and a small car of zinc per month. The lead returns from $8,000 to $9,000 per car and the zinc about $3,000. Recent advances in the price of lead make the outlook for the operation promising, he said.

Development of the north orebody on the 400-ft. level, the mine's deepest, is proving the orebody better than expected, he said. It has been opened for 260 ft. and averages about 40 ft. in width. The grade of ore is slightly better than on the 300-ft. level. Drifts on this orebody have been driven in both the hanging and foot walls. A crosscut at the end of the two drifts shows the vein to be 62 ft. wide at that point. The northerly limits of the shoot have not yet been reached, and it may extend another 100 ft., Smith estimated.

Production from the north orebody is supplemented by ore from the south ore shoot to keep the mill running at capacity, he added. All ore in the south end has been broken and is being pulled as needed. The stope on that orebody is 140 ft. long, 25 ft. wide and extends from the 400 to the 300-ft. level, an actual distance of about 150 ft. This entire area is now filled with broken ore. It will take eight months to a year to pull it all, Smith said.

IRON COUNTRY

★Skubic Brothers, of Virginia, have begun **stripping at the Auburn mine** in Virginia under contract with the Oliver Iron Mining Co., owners. Two shovels and a fleet of Euclid trucks are in operation. The Auburn contains a tonnage estimated at 3,281,400; was last operated by the Oliver in 1902.

★Paul Zinner, regional director of the U. S. Bureau of Mines at Minneapolis, has announced that a **contract has been awarded the Atkins-Walker Co.** for diamond drilling on the eastern Cuyuna range in manganese-bearing iron ore. A maximum of 15 holes averaging 350 ft. in depth will be drilled.

★**Drilling by Inland Steel Co.** on its

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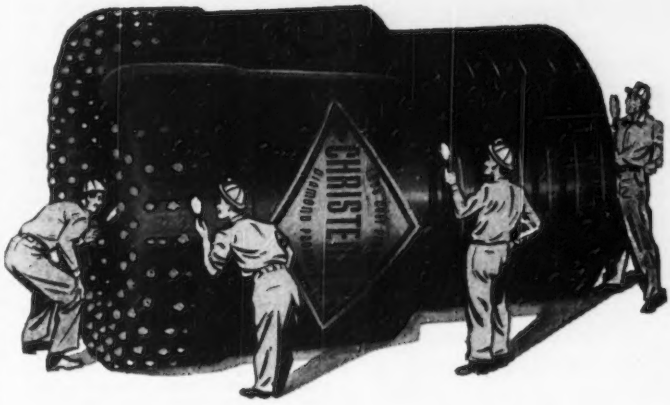

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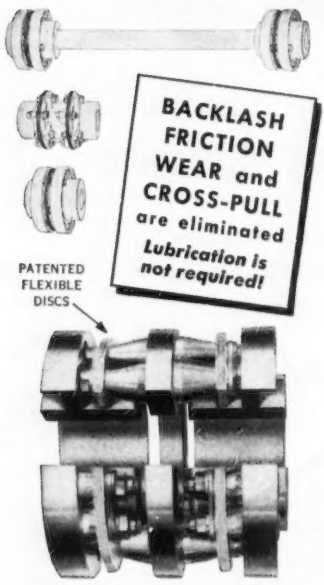

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Iron Country *(Continued)*

"C" orebody under option at Steep Rock Lake, Ont., is said to have been satisfactory. The company is now engaged in an additional drilling program and a geological survey.

★**Steep Rock Iron Mines, Ltd.**, expects to ship about 1,300,000 tons from its Errington mine on the "B" orebody this season. Last year's shipments totaled 1,134,261 tons.

★On Sept. 12 the Great Northern ore docks at Superior, Wis., **loaded 24 boats in 24 hrs.**, a record.

★**All-rail shipments** of manganiferous iron ore are being made from the Cuyuna range to furnaces at Granite City, Ill.

Benjamin F. Fairless, president of U. S. Steel Corp., has announced that the corporation is building three new ore boats for service on the Great Lakes. They will be the "largest and fastest in our Great Lakes fleet." One self-unloading vessel to carry limestone is also being built.

The Interlake Steamship Co. also plans to build a new oil-burning ore carrier for Great Lakes service.

★Minnesota Power & Light Co. has announced that it plans to **construct a large steam-electric generating station** on Colby Lake, four and one-half miles east of Aurora, Minn. Two 44,000-kw. steam-electric generating units will be ordered. The plant is expected to be ready for operation in 1953. The new units will add approximately 120,000 hp. of capacity to the company's system. When this plant has been completed in 1953, the company will have increased its capacity by 224,000 hp. since the end of World War II.

★**Republic Steel Corp. announces that the 45-mile railroad** from its iron mine in Liberia to the Atlantic Ocean is almost complete. Exploration has added a large tonnage of high-grade iron ore which can be mined by open-pit methods. Shipments will begin next year.

★**The Wanless mine** at Buhl, idle since 1928 (it was operated from 1914 to 1928 as an underground mine by Oliver Iron Mining Co.), is now being stripped by Cleveland-Cliffs. Two shovels and seven trucks are being used. The mine is working five days per week on a three-shift basis. Ore is being loaded one shift per day.

★**The State of Minnesota has issued a prospecting permit** covering the Longyear Lake Mining Unit No. 1 at Chisholm to D. D. Haley of Hibbing. Mr. Haley has turned the property over to the Junior Mining Co. which will begin exploration soon.

★Frank J. Smith, of Ironwood, and Bjarne L. Knudsen, of Ramsay, both with Oglebay, Norton & Co., will assume active supervision of the **development of Reserve Mining Co.'s taconite reserves.** Oglebay, Norton & Co. will manage the property for Reserve Mining Co. which is now jointly and equally owned by Republic Steel Corp. and Armco Steel Corp. The two concerns have acquired the interests of Wheeling Steel Corp., Cleveland-Cliffs Iron Co. and the Montreal Mining Co. It is understood that the first unit of the Beaver Bay plant will be constructed as soon as plans can be completed. It will produce 2½ million tons of iron ore pellets annually and cost about $60 million. A 47-mile railroad, dock and breakwater protected harbor will be required.

★The Michigan Tax Commission has **rejected an application from the Jones & Laughlin Ore Co.** for a reduction in the valuation of its Lucky Star iron ore property at Negaunee from $375,000 to $25,000.

★The secretary of the Hanna company local No. 1624, with 575 members, has wired Philip Murray, president of the CIO, in Pittsburgh, that the Hanna miners in the Iron River district have gone on record calling for an immediate reopening of their contract for the purpose of **obtaining a substantial wage increase.** The contract provides that the wage clause may be reopened by either side Nov. 1, 1950.

★**Inland Steel Co. is diamond drilling** south of its Sherwood mine in the Iron River district. It has acquired several pieces of land which it will explore.

★After several months of exploratory diamond drilling, the M. A. Hanna Co. plans to undertake **large-scale operation of low-grade iron ore lands** in northern Dickinson County, east of Randville. Mining will be open pit for some time before underground work will be necessary.

★The M. A. Hanna and Inland Steel companies are now **requiring their executive and supervisory men to have periodic physical examinations** at the Mayo Clinic, Rochester, Minn., in line with the annual checkup required of production workers.

★M. A. Hanna Co.'s Richmond mine, at Palmer, has been **awarded a certificate of achievement in safety** for having worked 850 calendar days without a lost-time accident.

KENTUCKY-ILLINOIS

★**Full-capacity operation of the Alcoa Mining Co.'s new flotation mill** at the Hutson mine, zinc and fluorspar orebody in the Kentucky district southeast of Salem, will be started the first of next year. Tune-up operation on a one-shift basis with second and third shifts to follow within the next two months was begun in October. Capacity of the mill is 100 tons per day. A 523-ft. shaft has been completed. Hutson ore will average 28% zinc.

★R. N. Frazer, of Marion, Ky., vice president in charge of operation and

sales of the Kentucky Fluorspar Co., has announced **purchase of Inland Steel Co.'s properties in the Illinois fluorspar district.** Inland suspended its operation in the Illinois field two years ago. Included in the purchase are acreage and mineral rights of five tracts in Hardin County as well as the former Hillside flotation mill, powerhouse, gravity mill and headframe in Rosiclare, Ill. The Wall tract in the Cave-in-Rock section of the county; Dimmick tract, in Rosiclare; Lee tract; Burton tract; and 60 acres in Rosiclare, site of the old Hillside mine and mill, are the newly acquired properties.

★Effective Oct. 1, **a voluntary 10% wage increase** to all hourly-paid employees was granted by Alcoa Mining Co., fluorspar branch, at Rosiclare, Ill., according to announcement by Walter S. Skeels, works manager. Salaried employees also were given appropriate raises. A total of 240 hourly-paid employees and 60 salaried employees were affected by the general increase in line with recent action of the Aluminum Co. of America, of which Alcoa is a subsidiary.

MICHIGAN

★**Copper Range Co. is engaged in planting 240,000 Norway pine trees** on its lands west of the old Atlantic mine. Plans have been made to plant several thousand acres of idle lands not suitable for farming in Houghton, Keweenaw, Ontonagon and Baraga counties. To do the job, Copper Range has purchased a mechanical tree planter capable of putting in over 1,000 seedlings per hour.

★**Isle Royale Copper Co.** has now paid a total of $6.30 in liquidating dividends. The last one, for 80c. per share, was paid Sept. 28 to stockholders of record Sept. 15. Two other dividends, were previously paid.

MONTANA

★The new "**Directory of Montana Mining Properties, 1949,**" by Millard L. Reyner and Carl J. Trauerman, is now ready for distribution from the office of the president of the Montana School of Mines at Butte. Known as "Memoir 31," the directory consists of 102 pages of text and maps of the various mining counties, as well as a map of the entire state showing where the mineral resources are located.

★Effective Sept. 11, Anaconda Copper Mining Co. employees at the Anaconda smelter and in the Butte mines went on a 6-day week basis, according to announcement of E. S. McGlone, Butte, vice president in charge of Western operations of the company.

★**Porter Brothers Corp. has concluded its gold dredging operations** north of Helena. The large Yuba floating dredge operated for nearly 14 years.

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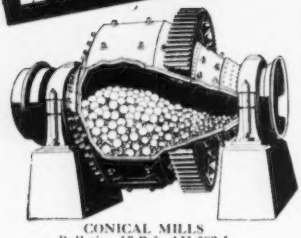
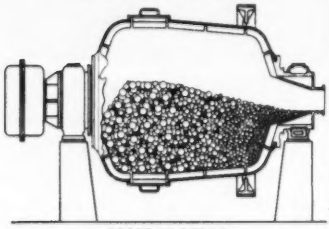
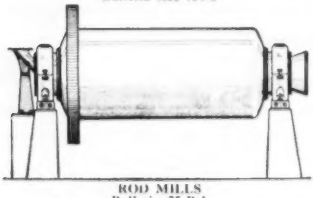


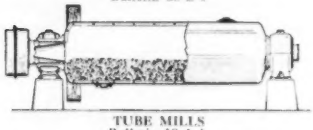
CONICAL MILLS
Bulletins 17-B-1, AH-389-1



TRICONE MILLS
Bulletin AH-414-1



ROD MILLS
Bulletin 25-B-1



TUBE MILLS
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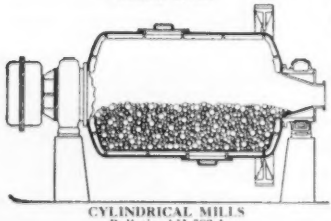

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Montana *(Continued)*

★**Montana Section AIME and Last Chance Gulch Mining Association held a dinner and meeting** at the Montana Club, Helena, on the evening of Sept. 21 with a record attendance. Al Nugent, president of the Helena association, presided and A. B. Martin, Butte, chief engineer of the Montana Power Co. and chairman of the Montana Section AIME, was toastmaster. After the routine business of both organizations had been concluded, O. P. Chisholm, Helena, president of the Mining Association of Montana, gave a review of the summer convention of that organization. Carl J. Trauerman, Butte, secretary of the MAM, gave a description of the huge Salt Lake meeting of the American Mining Congress.

★Anaconda Copper Mining Co.'s **new copper precipitation plant** will produce more than 500,000 lb. of copper per month, according to H. J. Rahilly, mine manager, in a recent address before Butte Rotarians. The plant works on 5,100 gpm. water with 0.6 lb. copper per ton of water.

"About 1¾ lb. of tin cans are required per pound of copper produced," he added. "The plant extracts between 92% and 94% of the total copper in the water."

Located in North Meaderville, the new plant was put in operation in September, 1949.

NEVADA

★Property of the **Rochester Consolidated Mines Co.** in Rochester Canyon, Pershing County, suffered serious damage Sept. 14 when a flash flood sent a 5-ft. wall of water hurtling down the canyon. The water tore off two concentration rooms of the mill, upset two garages, and rolled a 15-ton caterpillar tractor 100 yd.

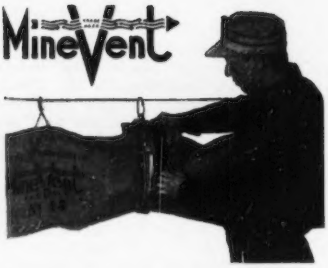
★Concrete piers have been poured and work is progressing on a **30-ton gold ore milling operation** of the Golden Horse Shoe Milling Co. in Pershing County.

★Magnus G. Thomle, of Mina, is **developing an extensive deposit of bentonite** 4 mi. west of Sodaville in Mineral County.

★Underground activity in the **Goldfield mining district** is proceeding steadily and with good results. In the White Rock lease bloc the Red Hill Florence Co. is reported to be working in two directions from the 385-ft. level following an ore-bearing formation said to be rich in spots. The vein has reached a width of 4 ft. in places, and assays have indicated a value of 6 oz. of gold to the ton.

★**Pacific Butte Mines Co.** is reported to have opened an ore shoot for a distance of 30 ft. in the Montezuma property in Mineral County. The vein, which averages 18 to 24 in. in width is said to have given high values in gold, silver and lead.

MineVent



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★New housing planned by the **U.S. Gypsum Co. plant** at Empire in north Washoe County will make it one of the largest mining camps in Nevada. The building project is to cost an estimated $150,000.

★**Work on the new Morris pit at the Consolidated Coppermines property** at Kimberly is proceeding rapidly, with 100 men employed by the Isbell Construction Co. The Isbell firm is under contract to move the overburden and ore.

★Core drilling has started at the **Richmond - Eureka silver - lead - zinc property of Eureka Corp.** on Ruby Hill, with the first hole west of the main Fad shaft.

NEW MEXICO

★One of the big pieces of mining news in the Southwest during September was that telling of the discovery of what Jesse C. Johnson, of the Atomic Energy Commission raw materials operation calls **"one of the most important carnotite discoveries in the past 20 years on the Colorado plateau."** The discovery was on Navajo lands in New Mexico, Arizona and Utah, where these states meet at the "four corners." The AEC has let contracts for diamond drilling in the area to find out how much of this uranium-bearing ore exists. Four companies are reported to be interested in building a uranium processing plant at Shiprock. Navajo rules regulating white mining permits on the reservation are to be relaxed. The Indians are expected to receive a 12½% royalty on the production.

★The **mining and processing of scrap mica in northern New Mexico** appears to be in for a revival, with announcement of plans for a mica processing plant at Mora, northwest of Las Vegas.

OREGON

★The federal government has ordered **a 50% increase in zirconium production** at the Bureau of Mines' electrodevelopment laboratory at Albany. The order, involving an expenditure of about $100,000, will require the installation of five new furnaces, bringing the total to 15. This new expansion follows the completion of a new $350,000 plant ordered by the bureau three months ago. By Dec. 1, when the new furnaces are in operation, production of the rare metal will total 2,500 lb. a week. Zirconium is used for undisclosed defense purposes.

★Little Arctic gold mine, located near the summit of King Mountain in Jackson County has been leased by **Harmon Gold Mines, Inc.**, from McTimmons & Associates. B. P. Harmon, Roseburg, Ore., is president of the new company. Ore at the mine

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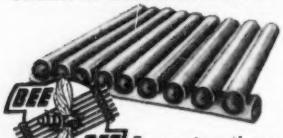

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Oregon *(Continued)*

consists of free gold in serpentine.

★The Oregon State Department of Geology and Mineral Industries has developed **a new use for Oregon volcanic glass** by production of a glaze that can be used to replace more costly material. The glaze was perfected by C. W. F. Jacobs, department ceramist, after three years of experimentation with numerous non-metallic products found in Oregon. The volcanic glass, used as a feldspar substitute in a ceramic glaze, produces a glaze suitable for stoneware, artware and terra-cotta products.

★Five western regions were to be represented at the **second annual resource management field conference** held at the Squaw Butte-Harney branch experiment station in September. Discussions were to center around problems of land use and land management.

★**Northwest Gypsum Co.** will transport its product from the Oregon to the Idaho side of Snake River through a pump and pipe device. Cost of equipment, according to Dr. F. M. Handy, manager, will be about $6,000. The system devised will handle from 60 to 100 tons per hour at 5c. a ton.

TRI-STATE

★Mattes Brothers, E. A., Jr., (Gus) John, and Dave, have taken over the Manning mill from the Linda M. Mining Co. The Linda M. company, composed of A. J. Stewart, Southworth and associates has also changed, with Mr. Southworth now in full charge of the mine on the Range Line in Joplin.

The Manning mill has a capacity of more than 100 tons of ore per ten-hour shift.

★Howard and Orville Price have opened up **a rich strike of zinc blende** two miles east of Baxter Springs. The property is a 120-acre farm owned by the Prices. They contracted for the drilling of six holes, all of which passed through the rich orebody and then let a contract for shaft sinking. To date 300 tons have been milled, running 12% zinc blende, and 3% lead ore. One large mine operating company in the district is said to be within $10,000 of closing the deal to buy the property from the Prices.

★**Federal Mining & Smelting Co.** is pumping the old A.B.C. and Northside mines. The Northside mill is being repaired and reconditioned to mill its own ore and to do some custom milling.

UTAH

★Sale of American Smelting & Refining Co.'s smelter at Murray for a sum "in excess of $500,000" has been announced in Salt Lake City.

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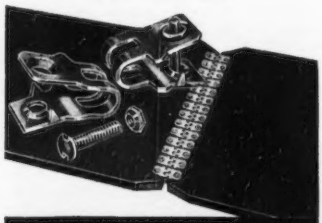

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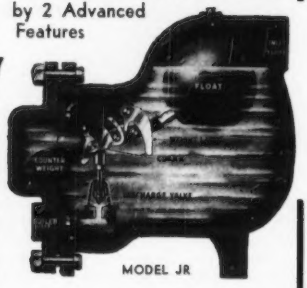

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★Utah State Land Board officials are studying a new proposed mineral lease designed to help increase exploration of mineral and oil lands in the state, which would parallel the federal leasing systems in many respects.

★New discoveries of low-grade uranium-bearing ores 5 mi. northeast of Marysvale may expand the commercial mining area in that district.

AEC assays run at Grand Junction, Colo., indicate values ranging from .09 to .01% uranium oxide. Vanadium values run from a trace to .02%. Values are reported 60% autunite and 40% uranophane, a yellow uranium silicate. Chief interest in the find lies in the fact that uniformity of the values, spread over a large area, indicate they might be exploited by open-pit operations if milling were available at low cost nearby. It is likewise being pointed out that the showings are being found in rhyolite, which overlays monzonite. Commercial ore developed by the Vanadium Corp. of America and Bullion Monarch nearly due west is said to be in monzonite.

Interest has also developed in the fact that the latest finds indicate that uranium values in the Marysvale district are spread over an area nearly 10 mi. in length on the east-west axis.

★It is hoped that the $600,000 manganese treatment plant being built at Boulder City, Nev., will enable utilization of sizeable deposits of low-grade manganese located in several sectors of Utah. S. R. Zimmerly, chief of the metallurgical division, Region IV, U. S. Bureau of Mines and J. Bruce Clemmer, chief of the Southwest-Experiment Station, at Tucson, Ariz., will aid in the design and construction of the project.

★The Division of Employment Security of the Utah Industrial Commission estimates that about 2,000 jobs remained unfilled in the state as of Oct. 1. Manpower demands in the metal mining industry were termed "increasingly acute." Many miners left the state during the year-long shutdown of lead-zinc mines in the Park City district. In many cases, such workers are believed to have found stable employment in the Butte region.

★For the first time in company history, the stamp "KUE" (Kennecott Utah Electrolytic) is appearing on wire bars and sheets being produced in Utah. Kennecott Copper Corp.'s new $16,000,000 electrolytic refinery at Garfield went into sustained production the first week in October, sending copper plate and bars to Western and Midwestern mills. The initial electric arc furnace placed in service is pouring 20 tons an hour.

Coincidentally and equally important with the start of the first production of refined copper in Utah is Kennecott's new policy of selling its wares at a standard price throughout the United States rather than using the traditional Connecticut River Valley base price. Westerners believe

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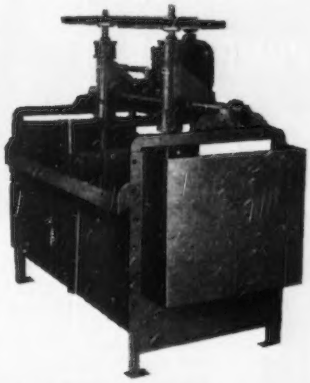

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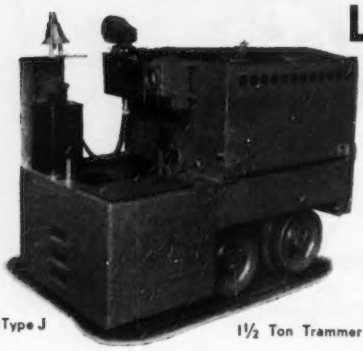

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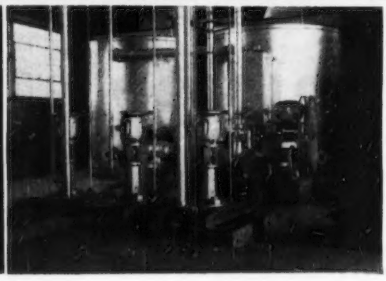
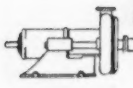


THREE NAGLE TYPE SW-OB PUMPS SERVE AMERICAN SMELTING & REFINING CO., DEMING, NEW MEXICO

Handling spill and washdown from the banks of lead and zinc flotation cells, three Nagle 1½" type SW-OB, frame 71G pumps, will render trouble-free service for American Smelting & Refining Co.'s new Deming mill because there are no stuffing boxes, no submerged bearings. They will return material from sumps to the mill circuit. Nagle Pumps ably handle slurries and froth—resist abrasion and corrosion. Pumps were sold by Mine & Smelter Supply Co. Send for Catalog 4906.



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INDUSTRIAL PUMPS FOR ABUSIVE APPLICATION

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Utah *(Continued)*

sizeable copper fabricating industries are bound to be attracted to the region as a result.

WASHINGTON

★Dale I. Hayes, western manager of American Zinc, Lead & Smelting Co., and associates, have leased the **Tungsten King group of mining claims**, giving the syndicate three groups of claims totaling about 3,000 acres. The Black Rock group has been under option for two years and the Truman has been under examination for about a year and a half. The properties are on the Canadian side in the zinc-lead belt of southeastern British Columbia and northeastern Washington.

★It was reported that **production at the Kaaba mine at Nighthawk,** just west of Oroville, would be stepped up to a 24-hr. schedule early in October. On Sept. 1 work was begun with one shift to clean up ore in the bunkers. Unofficial reports say a 1,500-ft. shaft will be started this winter and new levels will be explored.

★**Mines Management, Inc.,** now operating the Iroquois and Advance mines in Stevens County, is considering adding a property near Ainsworth, B. C.

★**Washington Brick & Lime Co.,** of Spokane, has purchased the Idaho Fire Brick & Clay Co.'s plants and property at Troy, Idaho. These include 220 acres of high-grade clay deposits, a 7½-acre plant area, and a 99-year lease on additional Idaho clay deposits.

★**Pend Oreille Mines & Metals Co.** expected to start the first 800-ton unit of its three-unit milling plant at Metaline Falls in October.

★At the Clarence Jordin property in northern Kittitas County, a nugget weighing more than a pound was reported to have been found recently. Two Yakima men are working the property under a lease and contract with Jordin. What was at first thought to be a pocket has developed into a vein of gold and quartz. About $9,000 worth of ore was taken out in two months.

★**Research in improvement of techniques** of removing germanium from electrolytic zinc solutions is being undertaken by WSC's School of Mines and the industrial research division under Jack H. Hopper of Portland. The presence of germanium, even in as small quantities as one part per million may prevent the proper deposition of zinc during electrolytic reduction. A number of zinc-lead deposits in the Metaline district produce a zinc concentrate abnormally high in germanium.

★Fifty-five persons attended the first class conducted by Professor Donald

L. Masson of WSC's new prospecting course being conducted at the Spokane Center of WSC.

★Exploratory diamond drilling work is underway in the **Leadhill district** near Metaline Falls. F. P. LaSota, postmaster, and associates discovered new ore showings while doing assessment work with a bulldozer.

★Last of the large mining companies entering the Northport mining district is the **Federal Mining & Smelting Co.** which has taken over the Van Stone zinc-lead property of Willow Creek Mines Co. Other nearby properties are under option, according to J. E. Berg, general manager of the Federal company.

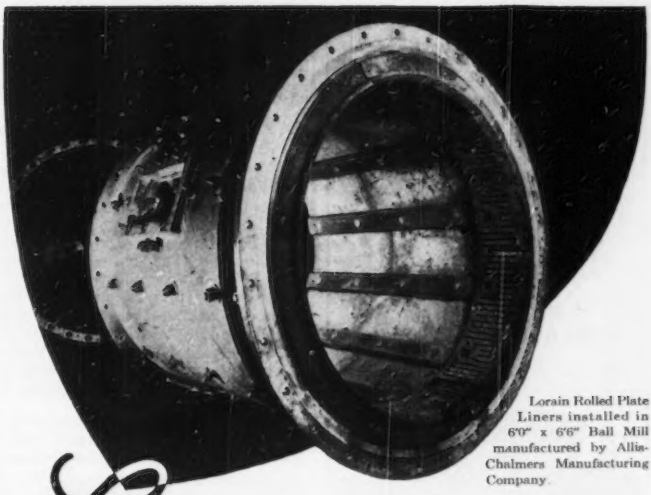
★Recent price advances are reported to have spurred diamond drilling work by Columbia Tungsten Corp. at its properties in Stevens County.

★**Gold Bond Mining Co.** which is operating four mines in the Blewett district, started production of high-grade ore from two mines this summer. Of 51 random samples the low assay was $211.75, the high $976.40, with an average $381.50 per ton, according to Frank Lilly, president. The company is stockpiling the development ore. The narrow seam containing the high-grade has widened, varying from 16 in. to 4½ ft. Other operations are underway in the same area. Toppenish men in the past two years have built an access road and driven a tunnel at the Sonny Boy prospect where diamond drilling is progressing underground. Washington Meteor's Culver holding is being reopened by interests from Vancouver, B. C. Gold Gulch Mining Co. has been doing preliminary development work and many other operations are said to be producing in the district.

★According to the U. S. Bureau of Mines, **lead production in the state** in July was 700 tons compared with 800 tons in June, while zinc was 1,170 tons in July compared with 1,205 in June.

★Wage increases amounting to 10% for the 3,600 Trentwood and Mead employees were agreed upon by representatives of the company and the CIO union. The new rate was to become effective Oct. 1.

★A profit-sharing incentive bonus plan in addition to regular wages has been instituted at **American Zinc, Lead & Smelting Co.'s** operations at Metaline Falls, according to Dale I. Hayes, western manager. Put into force Oct. 1, the plan will affect about 150 employees at the lead-zinc Grandview mine and mill. The semi-monthly bonus is based on the number of tons of concentrates produced in excess of tonnage required to meet production costs. Supervisors and all employees except development workers who already receive incentive payments on a footage rate basis are included. Increased producton and reduced costs are expected.



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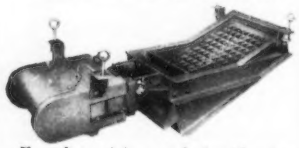

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IN CANADA

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★It looks like another **all-time high** for Canadian mineral production this year. Unless something quite unforeseen happens before year-end, the $890 million record chalked up in 1949 will be left well behind when the final 1950 totals are compiled.

Output of 13 leading minerals was higher in the first seven months of the year and, as almost all price levels have risen, total valuation will mount accordingly; possibly to cross the billion-dollar mark for the first time in Canada's history.

Highlights of the 1950 record will be a marked rise in the value of nickel due to last summer's price increase, an uppage of 30% in the volume of oil from the new wells of Alberta, and marked increases for leading industrial minerals. Gold is up, too, and the final silver total will show a gain of possibly 2 million oz. Output of silver in August, 2.2 million oz., was the highest figure reached in 10 years.

BRITISH COLUMBIA

★**Vermiculite has been discovered** in the North Thompson River area. Officials of the B. C. Chamber of Mines report receipt of samples from the Verity group of claims staked by J. B. French, E. E. French and O. E. French of Blue River.

★Arthur Lunden Clark, American authority on copper mining and metallurgy, has taken full charge of development of **Western Uranium Cobalt Mines'** Rocher de Boule holding near New Hazelton, which was acquired this year.

The main haulage tunnel is an elevation of 1,000 ft. below the lowest possible site for an adit to reach downward projection of the uranium-cobalt occurrences on the Victoria claims. While at present development is proceeding separately, it is expected ultimately the two mines will become a single operation.

In his initial reports, Mr. Clark says all of the copper ore developed in the old workings will be of milling grade and that the amount of mineralization is much in excess of that needed to justify continuing an exploration program to develop sufficient proved tonnage for establishment of a mill. A full-scale program will continue through the winter and installation of a hydroelectric plant will go ahead immediately with diesel power being used in the meantime.

★**Cariboo Gold Quartz Mining Co.** reports good ore has been found for 200 ft. in a raise on the "52-53" veins in the B. C. zone of its Cariboo operation and surface stripping by bulldozer has located veins where the upward projection of this occurrence should reach the top. Dr. W. B. Burnett announces stepped-up program aimed at developing this ore for mining in new levels both in height and depth from the 1,500-ft. level.

★**Sheep Creek Gold Mines, Ltd.,** producing chiefly base metals at Zincton in the Slocan, and the Paradise mine in the Windermere Valley, made a net profit of $150,000 in the quarter ending Aug. 31. The net was increased mainly by higher metals prices. Meanwhile, diamond drilling at a new low horizon at Zincton mine has been made possible by the sinking of a winze and latest progress reports are that a recent drill hole penetrated 8 ft. of ore averaging 20% zinc at a point 54 ft. vertically above the 11th level.

★Two new orebodies now under development on **Vanada Mines (1948)** sixth level on Texada Island show signs of carrying to greater depths. The company currently is shipping ore at the rate of 1,500 to 2,000 tons monthly to Tacoma, averaging $12 to $12.50 a ton. Values in gold and copper are nearly equal.

★**Island Mountain Mines,** Cariboo district, produced 1,645.16 fine oz. gold from 3,966 tons milled in August, compared to 1,644.46 fine oz. from 3,935 tons of ore in July.

★At the Bridge River district property of **Gray Rock Mining Co.,** the 370-ft. crosscut to intersect the main vein at 175 ft. below high-grade surface outcrops has now reached the halfway mark.

★David S. Tait, president of Privateer Mine on Vancouver Island, has been voted out of the board of directors after a showdown dispute among shareholders over the proposed financing of Tofino Gold Mine into production. Mr. Tait advocated renegotiation of an agreement with Camac Mining Co. to finance Tofino, in which Privateer holds a quarter interest, into production. Under an earlier agreement concluded in August, 1949, the Camac group spent $61,000 on the Tofino property, and following the winter shutdown made proposals to continue the work. These had been incorporated in a new agreement. The new board includes A. H. Davis, J. Howard Forrester, G. C. Elliott and J. A. McKay, Vancouver; A. S. Kerry, Seattle; and Joseph Pedneault, Victoria. Mr. Forrester and Mr. McKay are new to the board.

★Highland Bell, Ltd., silver-lead-zinc

producer, now has its new 50-ton mill in operation and **earnings are expected to increase substantially.** Concentrates will be shipped to Consolidated Mining & Smelting Co. at Trail. The mine is producing at the rate of more than 750,000 oz. silver per year. Net profit for the first six months of this year was $145,299, as against $94,593 for the same period last year.

★Work has been started on the new tramline to **connect the property of Indian Mines (1946) with the mill of Silbak Premier Mines** in the Portland Canal mining division. Silbak Premier has agreed to mine, tram and mill Indian ore at a cost of $11 per ton plus 10% for depreciation of equipment and 25% of profits after reserve for depletion.

★**A test shipment** of from 800 to 1,000 tons of ore from the Slocan district property of Van Roi (1947) Mines is being made to the Whitewater mill of Retallack Mines by Transcontinental Resources, which has acquired an option to purchase control of the Van Roi company.

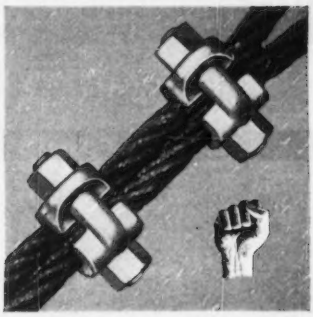
★Consolidated Mining & Smelting Co. at Trail is putting into operation a **new plant for treatment of dust and fume,** the main part of which is a large baghouse unit to recover the dust and fume now collected by two Cottrell treaters. Other major sections include a large spray-type cooling tower and a 286-ft. concrete stack.

★**Production is under way at the Cronin Mine,** 18 mi. north of Smithers, the Cronin-Babine mining company reports. Ore is chiefly silver, lead, zinc and cadmium. Several thousand tons of good grade ore is indicated by about 5,000 ft. of underground work and by surface exploration. Workings and equipment have been restored and overhauled.

★**Silver Bounty Mines,** in the Beaverdell area, is retimbering its main shaft from the No. 5 to the No. 7 level. The shaft is in a distance of 160 ft. and sinking and retimbering of a 7 x 10-ft. shaft will be done for an additional 60 ft. on the No. 8 level. From this shaft a crosscut will be driven for 60 ft. to pick up the vein at a favorable point determined by diamond drilling. From this intersection the company plans to drift on the vein in both directions and start shipments. Drifting on the first level will be continued to determine the west limit of the ore structure before another raise is attempted from the second shoot on the second level.

★A mill of 100 tons per day capacity will be installed at the **Cork-Province lead-zinc-silver mine** in the Slocan by Base Metals Mining Corp. on recommendation of C. Rutherford, consulting engineer, and Chamberlin Management Corp., operators of the mine. Favorable development of the property has continued and probable and possible ore above the 6th level is estimated at 50,720 tons, averaging

You can SEE the difference!



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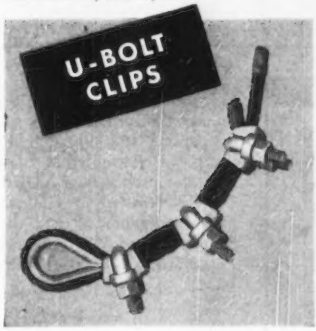

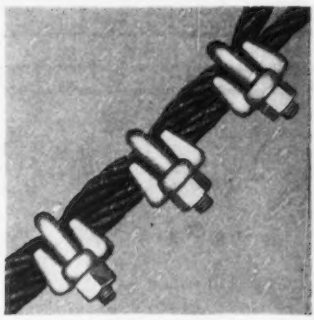

POOR BEGINNING. U-bolt clips pull wire rope into bowed shape when nuts are tightened, endanger safety. U-bolts *crush* rope.

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Capital No. 2 (now Biggs No. 2), built in 1906 as YCGF No. 3, has been redesigned and rebuilt 3 times and used in three different areas. Bucket speed was increased from 18.6 to 22.8 feet per minute, bucket capacity increased from 7 to 9 cu. ft., digging depth changed from 60′ to 61½′ and later reduced to 50′, then to 47′. Daily average running time upped from 18.317 to 22.1 hours.

2 DREDGES COMBINED

Biggs No. 1 operating at Rio Bonito, California, with 9 cu. ft. buckets and 50′ digging depth, was assembled in 1935 from the machinery of YUBA No. 48 (erected in 1921 at Fairplay, Colorado) and the rebuilt hull of YCGF No. 4 (Hammonton, California, 1914).

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British Columbia *(Continued)*

4 oz. silver, 5.4% lead and 8.3% zinc. Drifting on the new hanging wall ore zone on the 5th level has opened a length of 73 ft., averaging 8.5 oz. silver, 12.6% lead and 8.9% zinc across an average width of 10.5 ft. Ore at present is treated at Whitewater Mines mill.

★Immediate resumption of development and preparation for production has been authorized for **Vancouver Island Base Metals, Ltd.**, property near Duncan, by the controlling company, Base Metals Mining Corp. Development in 1949 indicated ore averaging 0.24 oz. gold, 4.5 oz. silver, 2.7% copper, 10.8% zinc and 0.66% lead.

★**Enlarged exploration and development programs** are under way at the Kicking Horse and Monarch mines near Field of Base Metals Mining Corp. In the Monarch mine, diamond drilling ahead of the 200C stope indicated new ore averaging more than 10% lead. A drive is heading to this ore. In the Kicking Horse, production continues from No. 1 and No. 4 ore structures with the workings being extended and new ore developed. In August, 3,985 tons ore were milled from the two mines, averaging 6.43% zinc and 4.9% lead. Production was below normal due to the railway strike which prevented shipment of concentrates during the latter part of the month.

MANITOBA

★Sherritt Gordon Mines, Ltd., reports that exploratory work on the "B" orebody below the 1,000-ft. level is **adding substantially to its copper-nickel reserves.** The "B" orebody was previously estimated at 1,640,000 tons from surface drilling. All the ore now going to the pilot mill is coming from this orebody and is reported to be easy to concentrate.

★**Sannorm Mines, Ltd.**, reports that no decision has been reached regarding resumption of operations at its property in the Rice Lake area. A program of underground work has been recommended as the most satisfactory method to explore ore possibilities.

★Ogama-Rockland Gold Mines, Ltd., reports that **development of new ore has not been up to expectations.** The Ogama vein which supplied the major portion of ore on the upper four levels has produced no ore whatsoever on the 875 and 1,000-ft. levels. The new No. 4 vein has given some encouragement in the past month on the 875 and 1,000-ft. levels. Diamond drilling is now proceeding to test the downward extension of the No. 4 below the 1,000-ft. level.

The outstanding amount of the loan now owing to Gunnar Gold Mines stands at $390,000.

LABRADOR

★The green light is shining now for the **big iron deposits** astride the Labrador-Quebec boundary. Contracts have been let for the building of the 360-mile railway to the ore country from the Port of Seven Islands on the St. Lawrence River.

Preliminary construction is already underway. The several necessary tunnels and some of the heavier rock cuts will be made this winter, and grading will start with the spring break-up. Next summer the Federal government will go ahead with the permanent deep-water docks. Overall costs by the time production begins will be around $200 million, which has been raised; $100 million by Hollinger Consolidated Gold Mines, the Hanna interests, and the five participating U. S. Steel companies; and $100 million through sale of bonds to a New York syndicate. Production is sighted for 1954, with plans made to take out two or three million tons in the summer of that year. Total reserves are now estimated at 400 million tons.

QUEBEC

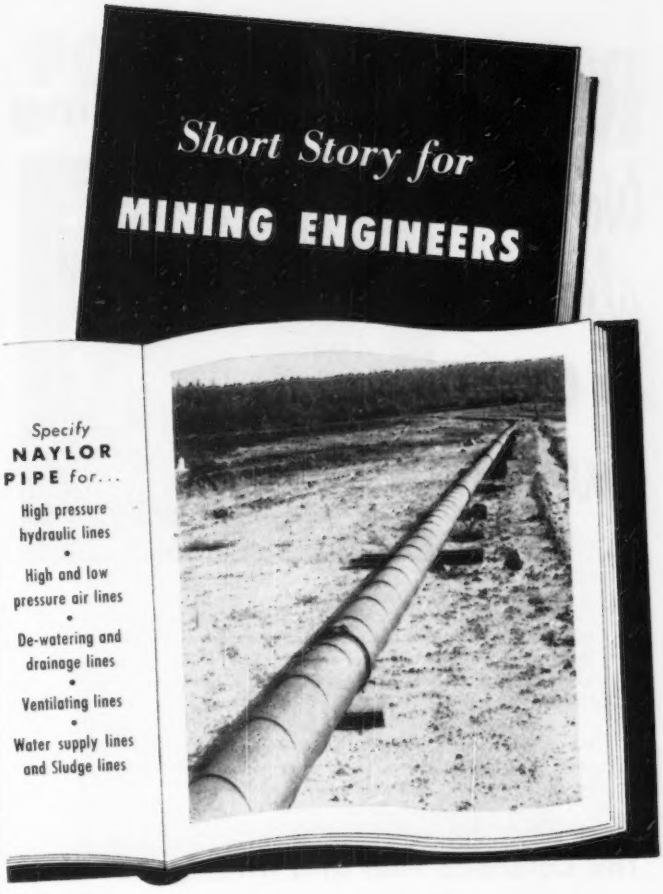
★How big is Quemont? The **giant young Rouyn area mine** has located another gold-zinc-silver orebody that would be a good-sized mine by itself in any area. Discovered in lateral drilling on the 1,260-ft. level, the new ore is unrelated to any previously-known showings. First three holes indicate an orebody 300 ft. long containing 1,280 tons per vertical foot. One hole showed 78.5 ft. averaging 0.30 oz. gold per ton, 3.87% zinc, and 0.87 oz. silver.

★Underground drilling has been making things shine for **Golden Manitou Mines**, too. The first flat hole drilled into the new east orebody at the Bourlamaque twp., base metal Mines' 960-ft. level gave the best intersection ever pulled in the mine, with 48 ft. averaging 11% zinc, 2.02% lead, 10.18 oz. silver per ton, and 0.026 oz. gold.

★**New tops in monthly profits** have been tumbling regularly for East Sullivan Mines. Net operating profits in September exceeded three-quarters of a million dollars, far above the previous top of $677,000 in August. Dividends, initiated last May, already total 37c. per share, and a third payment is expected before the end of the year.

Meanwhile, **shaft-deepening** at this Bourlamaque area base metal mine is nearing completion. The new bottom at 2,000 ft. should be reached by mid-November. At that time, also, stations will have been cut for each of the six new projected levels.

★With construction plans calling for start of operations early in 1951, the **new 350-ton cyanide mill** being built



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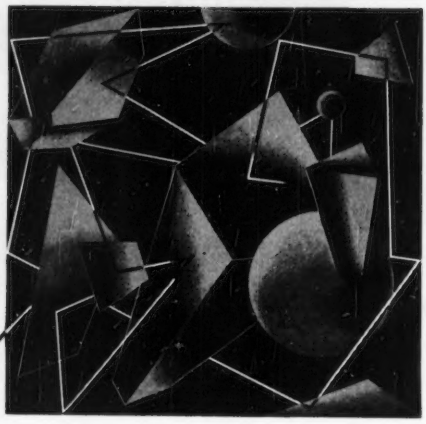

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Quebec *(Continued)*

by Donalda Mines in Rouyn twp. is going up on schedule. In the meantime ore shipments to the Powell-Rouyn mill are being continued at an average rate of about 255 tons. In the first seven months of 1950 gold production, including cost-aid, totaled $362,991 from 52,311 tons with average recovery $6.94 per ton.

★Operating profits of **New Calumet Mines** are running at a rate equivalent to more than 50c. per share annually. Higher base metal prices have made a big difference to this lead-zinc mine on Grand Calumet Island in the Ottawa River, and earnings have risen steadily since the first of the year. In August they topped $160,000.

★Ascot Metals Corp., operating near Sherbrooke in the Eastern Townships, is starting work at the **old Suffield lead-zinc mine** which adjoins its main property, and which was acquired by the company last summer. A mining plant is being installed, and the old shallow shaft is to be rehabilitated and deepened to 200 ft. Operations will be conducted by a subsidiary company, to be financed by the parent company and associated interests.

★The **smelter of Quebec Iron and Titanium Corp.**, located at Sorel on the St. Lawrence River, is now in production on a test basis. The first furnace is treating 300 tons daily to produce 100 tons of iron and 130 tons of 70% titanium oxide slag. By next spring all five furnaces should be in operation, handling 1,500 tons daily.

ONTARIO

★Newlund Mines has moved a long step closer to production with the announcement that a permanent mining plant is being installed, and the shaft deepened to open a second level at 300 or 400 ft. Between $500,000 and $600,000 has been set aside for the work.

The Canadian gold mining sensation of 1950, Newlund has developed an impressive volume of ore on its first level (though figures are not yet available as to dimensions and grade). The property is located in northwestern Ontario.

★At least five possible new orebodies well above mine average in grade have been indicated by drilling and initial drifting on the 4,075-ft. level at the **Porcupine property of Paymaster Consolidated Gold Mines.** In a brand new area, the new showings could have a major effect on the mine's future, with large tonnages suggested. Values could be several dollars per ton above the $8 per ton on which the mine is currently subsisting.

★Shaft-deepening to permit the **opening of six new levels** has been completed by Madsen Red Lake Gold

Mines, and crosscutting is in progress on four of the new horizons above the 2,950-ft. level. Distance from the shaft to the ore zones will vary from 600 ft. on the 12th level to about 1,200 ft. on the 17th, so that ore news may be expected in the spring.

★Broulan Porcupine Mines will probably report one of the best years on record when the 1950 profits are totaled. They'll be far ahead of 1949, when net earnings amounted to $161,084, equal to 5.9c. per share, for the first half of the current year saw profits of 5.1c. marked up. A similar amount should be netted in the second half.

★First results from the "C" orebody on the 675-ft. level at the Missinaibi property of Renabie Mines look good. Dimensions are not apparent yet, but typical $8 grade is in evidence. This orebody gave good ore on the first and second levels, but hasn't been explored at any horizon between the 250 and 675.

IN EUROPE

★**Increasing shortages of metals** have brought rising prices in Western Germany. Heavy demand within Germany for non-ferrous metals, plus increased exports of metals produced in Germany, have put a premium on both primary metals and scrap. Copper, nickel, lead, and zinc are unobtainable except in small quantities and at prices well above "official" levels. Aluminum began to be used in large quantities as a substitute for scarce copper, and it is now in short supply as well. Monthly aluminum production is running around 1,600 tons.

★**Zinc Mines, Ltd.**, of Falum, Sweden, has decided not to use a loan of $350,000 from the ECA, which had granted the loan to increase output from the company's zinc, lead, and copper mines at Garpenberg. Company officials were reluctant to accept the loan in the first place because they felt that the terms were too stringent. They now plan to use their own resources to finance the expansion program, which consisted mainly of buying new equipment.

★Figures recently released by the Italian Central Institute of Statistics show **notable increases in production** of various metallic ores. Bauxite output, which ran 9,480 tons in 1938, was up to 104,852 in 1949. For the first five months of 1950, bauxite production was 63,440 tons against 48,830 tons in the same period of 1949. Manganese ore ran to 288,940 tons in 1949, against 15,670 in 1938. Mercury ore output was 59,432 tons in the first five months of 1950 against 50,519 tons in the first five months of 1949. Lead ore output for the same period ran 26,182 tons against 19,629. High-grade zinc ores came to 57,993 tons against 47,038 tons.

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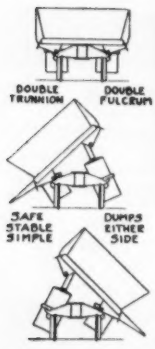

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IN LATIN AMERICA

MEXICO

★**San Francisco Mines of Mexico, Ltd.,** San Francisco del Oro, Chih., has begun renovating and expanding its lead, zinc, and copper flotation mill. It is reported that this mine, one of the richest in Mexico, has discovered new orebodies. The renovated mill will handle about 60,000 tons of ore per month. The mine is controlled by Union Corporation, a British mining company with large interests on the Rand in South Africa.

★**The Mexican Labor Ministry** is supporting a bill that would extend the effective period of labor contracts from two years to four. It is hoped that this move would cut down strikes, yet it is true that many strikes have occured in Mexico long before the expiration dates of contracts.

★**Cia. Metalurgica del Centro,** operated by Juan and Manuel Reyes, is building a new mill, capable of handling 100 tons of ore daily, at the company's lead-zinc mine in Zacatecas. This area is being drilled by several groups, but only the Reyes brothers seem to have found something so far.

★**High-grade fluorite** is said to have been found near Taxco, Guerrero. Value of the ore is said to run as high as $50 per ton, but capital to exploit the property is not forthcoming.

★**Possibility of increased shipments** of Mexican metals to Europe has been discussed in mining circles, following conclusion of the trade agreement with Western Germany. The pact calls for sale to Germany of $4,500,000 in silver, $1,500,000 in zinc, $1,200,000 in lead, and $1,000,000 in electrolytic copper, all from Mexico's mines.

CHILE

★Although the political atmosphere and economic conditions generally have not favored a large output of copper from small or medium-sized mines, the present price of the metal, plus the likelihood of a long continuance of high prices, have brought about the reopening of a number of these smaller producers. **Cia. Minera Cerro Negro** and **Cia. Minera Merceditas** have reopened. The **Farellon Sanchez mill,** acquired by the Callejas brothers, is due to begin running soon. **Cia. Minera Tocopilla,** one of the oldest Chilean-owned properties in northern Chile, has acquired several neighboring claims, from which it is producing about 500 tons a month of 20% copper ore. There is talk of reopening **the Chagres smelter,** which has not run

since Metals Reserve operated it on a toll basis, closing it in 1945.

★**Six consecutive dry years** in northern Chile are cramping many mining camps for lack of water. At Domeyko, where Chile's Mining Bank has run a cyanide mill for more than 15 years, water supply has fallen off to the point where the Bank cannot start a new 50-ton flotation section recently completed.

★Production at the three large copper companies in Chile has been hampered this year by a steady stream of strikes or slow-downs, most of them aimed at the Government rather than at any real economic benefit. Men at **Andes Copper** went back to work early in October, long after a Government decree had ordered a resumption of work. **Chuquicamata** has suffered several work stoppages or slow-downs. **Braden** appears to have assured peace until December, 1951, with a new contract. Result of this labor unrest shows up in production figures and in Chile's income. Mineral products exported from Chile are running well below last year in value. Bar copper exports averaged 25,400 metric tons a month in the first quarter, against 29,200 tons per month in the first quarter last year.

BOLIVIA

★Industrial and technical circles have campaigned vigorously to get men nominated to run **the Banco Minero** who have some mining background. Heretofore, the men controlling the Banco Minero have had almost every sort of qualification except a knowledge of the mining industry. A weakening of the Bank's potential service to the mining industry is felt to be the result.

★**The Rosario gold deposit** in Loayza Province, Dept. of La Paz, which was worked extensively in Colonial times, will soon be reopened on a small scale by Armando Taborga. Once the largest gold property in Bolivia, the deposit will now be mined at a rate of about 50 tons daily, feeding amalgamation plant.

★**Ciani & Cia.** of Milan, Italy, powder manufacturers, plan to build a plant in Oruro to make explosives for the Bolivian mining industry. Cost of the project has been estimated at about $3,500,000. The plant is to be financed through a Bolivian-Italian commercial treaty, now being negotiated. Half the cost will be paid in local currency by the Bolivian Government; the other half to be paid in Bolivian lead, antimony, and tin for Italy.

PHILIPPINES

★Reports from **Mindanao Mother Lode** continue to be highly encouraging. August gross production was valued at 853,273 pesos from milling

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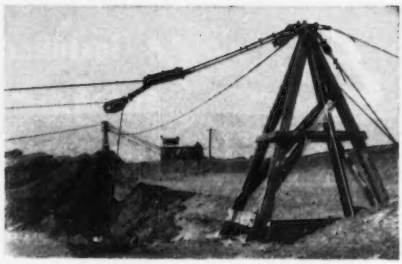

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STORY BEHIND THE PICTURE

A 50-year accumulation of waste coal silt at a Pennsylvania mine is being reclaimed by a 3 cu. yd. Sauerman Power Scraper to a processing plant where the waste is converted into usable fuel. The above photo shows the scraper making its first cut into the pile, which is 1500' long, 700' wide and 50' high.

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Philippines (*Continued*)

9,500 tons, a new record for 1950 both in tonnage and value. The 925 level shows an ore shoot over 400 ft. in length averaging 0.72 oz. per ton over 40 in. in width. The 1,000-ft. level has been even better, with ore averaging around one oz. per ton across 3 to 4-ft. widths. Diamond drilling horizontally from levels on the Tabon vein have located parallel structures with high values. The No. 50 vein, 1,000 ft. from the Tabon on the east, has improved, showing better widths and a stronger structure. The main shaft will be sunk deeper, and it appears now that the Tabon and No. 50 vein may intersect at about 1,500 ft. Water continues to be a problem.

★**Surigao Consolidated** had a gross production of 204,540 pesos in August from milling 9,100 tons. Considerable high grade ore is being developed on the 500 level, with the structure increasing in width. Some shaft trouble has been encountered on account of very heavy ground. Timber is high.

★A dragline dredge is operating on the Josefina claim of the **North Mindanao Mining Co.**, about 7 miles from Surigao. E. Lang, who has had extensive experience with this type of equipment for the old Mindanao Mining Co., is in charge. Before the war this ground was the scene of extensive hydraulicking operations with fair success. Good gold recoveries are reported from the dragline in spite of a water shortage.

IN AFRICA

★The Government has granted a mining lease over the 5,830 claims in the Merriespruit area, south of Virginia and Harmony in the Orange Free State. As soon as the lease is issued, it will be ceded by Middle Witwatersrand, Ltd. to the **Merriespruit Gold Mining Co.**, a group in which **Kennecott Copper Corporation** has a substantial interest. The lease formula is a stiff one, and seems to reflect participation of American capital and the consistently good borehole results. The mine will probably be comparatively shallow and work has already begun on two shafts. Average depth of payable ore is 2,700 ft. Kennecott has agreed to guarantee provision of £2,562,500 working capital for Merriespruit, of which £2,000,000 will be in 15-year debentures, and £500,000 will be subscribed firm, and the balance underwritten. Kennecott will also take £562,500 worth of ordinary shares at par.

★**The Southern Rhodesian Government** seems doomed to disappointment in its hope for expansion of gold mining as a result of devaluation of the pound. Although this action increased the value of the gold produced in the first ten months after devalua-

tion by nearly £1,500,000, it was not all profit. Cost of labor and supplies increased fast enough to take care of a good part of the gain. Gold production and number of operating mines are both dropping.

★**The British South Africa Co.** has owned the right to levy a royalty on all minerals taken from Northern Rhodesia, and a profitable right it has been. Recently, however, the territory's legislature passed a motion levying a tax on the royalties, and an agreement was later reached in London transferring the rights to the Northern Rhodesian Government after 37 years. Meanwhile the South Africa Co. will pay the Government 20% of its net revenue. With copper at more than £200 in London, this 20% will add more than £500,000 to the Government's yearly income, for copper alone.

★South Africa hopes to get into the export market for ferro-alloys early next year. **African Metals Corporation, Ltd.,** is putting up new furnaces that will take care of local needs and leave a surplus for export. Large tonnages of manganese and chrome ores are being sold abroad, where they are made into alloys. The South Africans would like to do that at home.

★**The main Rhodesian copper companies** seem bent on transferring their headquarters from London to Africa, owing to the high taxes levied on them in England. N'Changa is moving control to Africa, and Tanganyika Concessions has agreed to shift to Southern Rhodesia from England. Shareholders of the latter company also voted to require the company to hold for at least 10 years its shares in Union Miniere du Haut Katanga and the Benguela Railway, which carries Katanga's products to the Angola coast.

IN AUSTRALIA

Melbourne Letter

Although one might have expected the contrary, Australian lead and zinc supplies to world markets are likely to fall off considerably as a result of the surge in base-metal prices since the outbreak of the Korean crisis. Here is why:

The controlled domestic selling prices of 3½c. per pound of lead and of 4c. for zinc became more and more unrealistic as international quotations soared, and producers understandably sought to export as much as they could to get the benefit of much higher overseas prices.

Domestic consumers, reduced to about 40,000 tons for each metal per year, protested they were being starved. The metal producers pointed out that there was plenty of secondary metal about, particularly scrap lead, to supplement deliveries of new metal. But although the government

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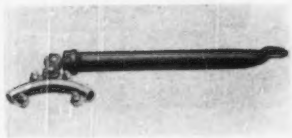

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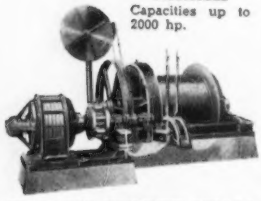

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Australia *(Continued)*

some time ago gazetted an order requiring holders of scrap lead to report their stocks, apparently little scrap found its way back into circulation. It is believed that most of the scrap is held by hoarders.

To lighten the subsidy which the producers are, in effect, paying to Australian industrial consumers by foregoing the profits from high export prices, the government has now decided to raise the domestic selling price for both metals to 6½c. per pound. In return for this concession producers are expected to supply all bona fide domestic requirements for current consumption. As a result, home consumption of both metals is expected to rise about 20% above present levels and thus to take a big bite out of exportable surpluses. Estimates place future lead consumption at 50,000 tons and zinc consumption at 54,000 tons.

To narrow the gap between domestic and international selling prices still farther, and at the same time to forestall the possible inflationary effects of rising mine earnings, the government is reported to be planning to impose a levy on exported base metals (as well as on exported wool). There is no indication whether the projected impost is to take the form of an outright export tax or whether it is to be used to build up a price support or stabilization fund against lean years in the metal markets, as in the wool levy plan.

NORTHERN TERRITORY

★Extent and quality of the reported **uranium find** in the Rum Jungle, near Darwin, will not be known for some months and perhaps not for a long time. Investigations by government geologists are still in progress and even when they are completed, it is not likely that the results will be shouted from the roof-top of the Bureau of Mineral Resources. However, if the find is worthwhle, there seems to be no way to hush up the payment of a reward to the discoverer. So far, only £1,000 ($2240) has been marked for payment in the Territory, a long shot from the maximum of £25,000 scheduled for a major find.

★**Northern Star (Tennant Creek) Gold Mines N.L.** will make a new capital issue of £40,000 to complete its plant and develop its ore reserves. Haulage capacity of the main shaft is to be increased to provide three-compartment haulage. This will temporarily delay the commencement of production.

WESTERN AUSTRALIA

★**Australian gold production** for the first six months of 1950 was 417,227 fine ounces, contrasting with 450,987

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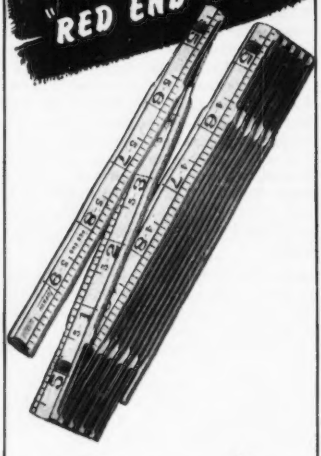

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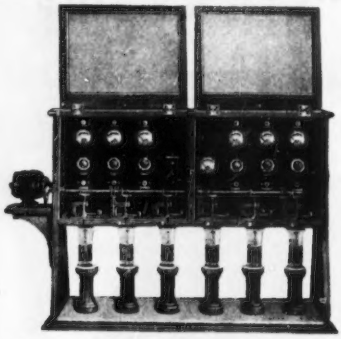

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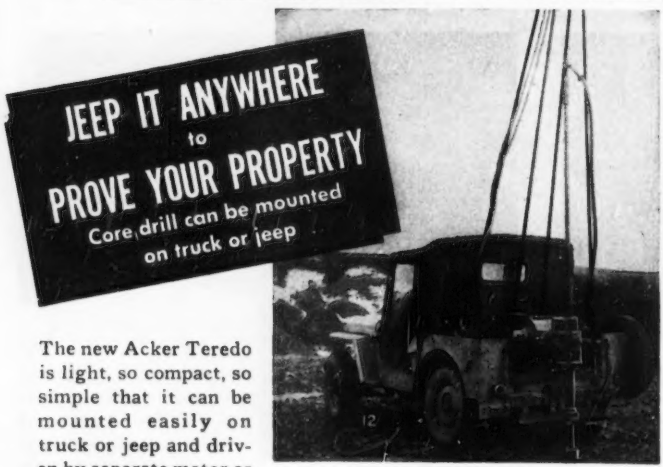

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Western Australia *(Continued)*

in the corresponding period of 1949. Paradoxically, the higher domestic gold price due to last year's currency devaluation is to blame for the decline in production. It is now obvious that many mines are operating in formerly marginal ore which became payable ore when the gold price was raised. The higher price offered an opportunity to dispose of low-grade reserves at a profit and to leave higher values in the ground against the day when rising costs caught up with the higher gold price. As mounting costs have already wiped out much of the devaluation premium, mines may soon be compelled to shift back to ore of higher assay and this may well be reflected in higher returns. So far, however, the deficit gap between pre- and post-devaluation gold returns has had a tendency to widen rather than close.

TASMANIA

★**Aberfoyle Tin N.L.** earned a net profit of £80,630 in 1949-50, contrasting with £50,926 in the preceding year. In 1949-50 the mill treated 29,579 tons (25,362) of ore for a recovery of 455.6 tons (424.9) of tin concentrates and 119.9 tons (90.4) of wolfram concentrates. Estimated ore reserves have risen sharply to 219,699 tons, from 145,472 a year ago. Sales of tin concentrates had to be made at fixed government prices; £555 a ton of metal from July 1, 1949, to January 9, 1950 (equivalent to 55½c. after devaluation) and £655 per ton thereafter (65½c.).

★Management of **Montana Silver Lead N.L.** has decided to go ahead with the construction of an ore-dressing plant. It is expected to be in operation early in 1951. Until further development has been carried out, a minimum tonnage of 6,600 tons a year will be treated for an estimated recovery of 1,100 tons of concentrates.

QUEENSLAND

★Wage increases and improved conditions claimed by the 1,066 employees of **Mount Morgan Ltd.** would cost £233,765 a year if granted, a representative of the company told the Industrial Court. He said that the total profit for the past financial year had been £350,447. The company had been in existence for twenty years and had not yet been able to pay back to stockholders their invested capital. The union sought a general wage increase of 20%, time-and-a-half penalty rates for Saturday work and double pay for Sunday work. It also claimed pay for all statutory holidays not worked and three months' paid leave after ten years' service. The court has not yet handed down its decision.

STANDARD ENGINEER'S REPORT

DATA

PRODUCT Chevron Starting Fluid

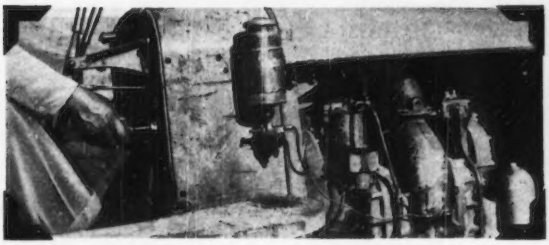
UNITS A. C. diesel engines HD-7 tractors

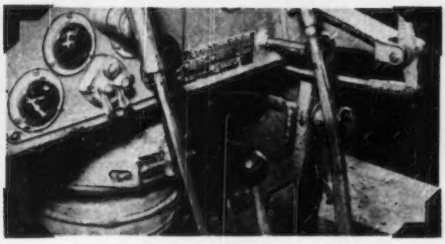
CONDITIONS 25° below zero weather—parked in open shed

EQUIPMENT Permanent primer with atomizers on blower

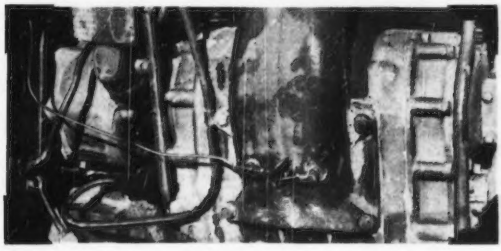
FIRM John W. Graves Heppner, Oregon

Engine starts on first turn at 25° below zero!



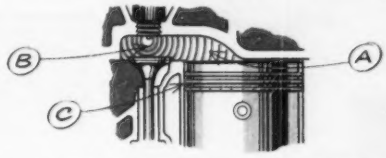


CHEVRON STARTING FLUID started this engine instantly every time during a severe Oregon winter, even when the tractor had been idle for several days in temperatures down to 25° below zero! John W. Graves, owner, says, "Power in the starter battery would last only for two or three revolutions of the engine, but Chevron Starting Fluid required only one turn to kick it off." With one or two strokes of the dash-mounted pump, fluid was forced from the storage tank (left center) into the "blower", before the starter button was pushed.



ATOMIZER NOZZLES, as shown on this diesel "blower", are also used to inject Chevron Starting Fluid into intake manifolds of gasoline engines. Complete primer equipment may be purchased from your fluid supplier. Chevron Starting Fluid comes in 3-pint cans, and capsules of two sizes—7CC's and 17CC's, packed 12 and 24 per can. It is approved by leading engine manufacturers.

How CHEVRON Starting Fluid Starts Gasoline and Diesel Engines Instantly



A. Atomizes in lowest temperatures and provides powerful, easily fired vapor in combustion chamber.

B. Pressure, or the weakest spark, fires mixture—turns engine and heats air for regular fuel mixture.

C. Contains lubricant and additives—prevent cylinder wear and ice formation in primer equipment.

HOT NEWS — COLD ENGINES

FREE BOOKLET gives you more facts on Chevron Starting Fluid—shows where it should be applied in different type engines. Write or ask for it today.

CHEVRON STARTING FLUID

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FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

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STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago, New Orleans
THE CALIFORNIA COMPANY • Denver, Colorado

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Increased production at a West Coast assembly line caused a parts shortage. Shipment in transit was located at St. Louis in late afternoon and Air Expressed to coast. Delivered 5 A.M. next morning. Speed like this keeps production rolling, lets you meet every delivery date. Shipping charge for 50-lb. carton: $24.56.

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How to recover gold and silver

by cyaniding and concentrating processes

THIS book gives a comprehensive, detailed picture of the ore-dressing and hydrometallurgical methods used in the chief mines of the world in recovering gold and silver. It gives engineers, executives, operators—or anyone concerned with recovering bullion by cyaniding and concentrating processes—all the operating data and methods, flow-sheets, testing procedures, etc., needed for making use of the techniques which have *proved most efficient in actual practice in the industry*. The first part of the book describes all the principal unit processes used in recovering bullion, illustrating them with examples from actual practice, as well as covering special methods used for treating refractory ores. The second part of the book shows you typical treatment plants, selected from the most important gold and silver mills throughout the world.

Just Out! Enlarged 2nd Edition

CYANIDATION and CONCENTRATION of GOLD and SILVER ORES

By JOHN V. N. DORR, *Chairman of the Board*, and F. L. BOSQUI, *Chief Metallurgical Engineer*, both of the Dorr Company, New York.

509 pages, 6x9, 101 illus., $8.50

BEGINNING with a brief historical survey of the field, this book takes you through every operation in the recovery of gold and silver by cyanidation and concentration. It covers the testing, examination, and sampling of ore, its sorting, and the crushing techniques used in reducing it. It tells you how ore is classified . . . how it is separated . . . and how both sand and lime are treated.

It discusses roasting, direct amalgamation, barrel amalgamation, and the precipitation of gold and silver. The factors entering into controlling the operation of a cyanide plant are explained, as are the properties and control of various cyanides. Discussed, too, are various miscellaneous processes for extracting gold and silver values.

The book describes methods for treating simple and complex ores, showing most effective practices in the principal gold- and silver-producing areas of the world. The factors affecting the cost of building, maintaining, and operating a plant, as well as power requirements for working with various ores are considered. An appendix gives helpful data on tests, methodology, measures, etc.

MANY HELPFUL FACTS ADDED IN THE SECOND EDITION:

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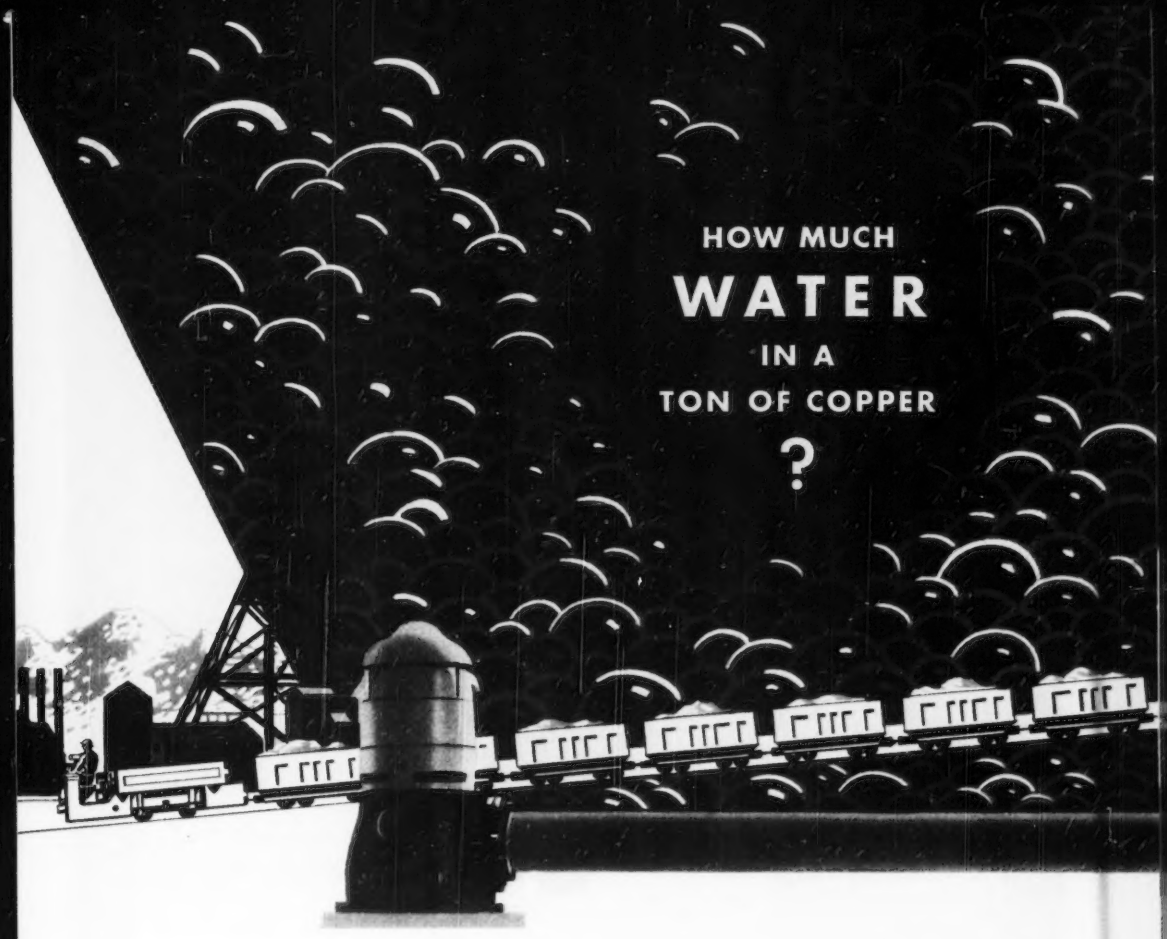

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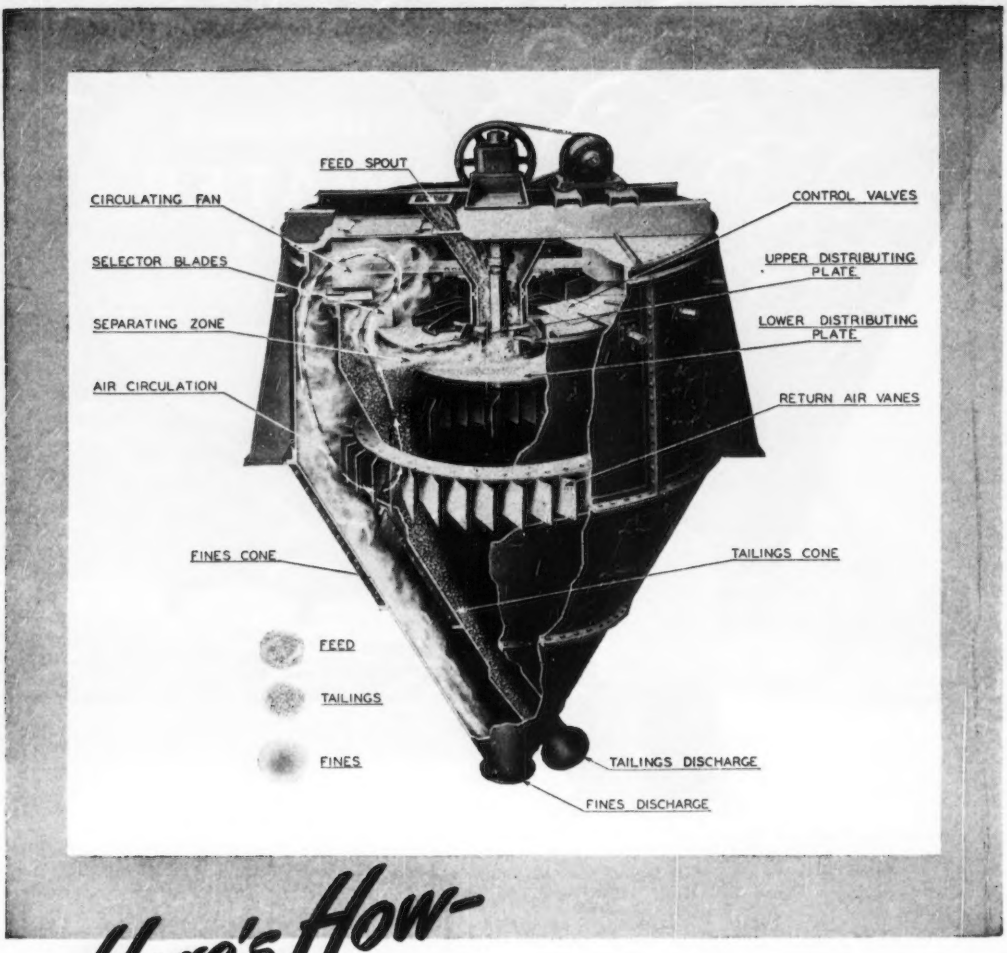

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Exact regulation and control of centrifugal forces and air currents, one counteracting and overbalancing the other so precisely that by simple adjustments a product of almost any desired fineness is selected and collected, while coarser sizes are rejected . . . that's the principle of operation of Sturtevant Air Separators.

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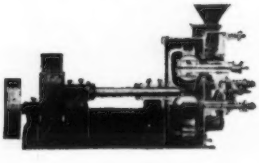

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Capacities from 12 to 18 tons per hour. Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

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Herb Fisher, rigging foreman for Morrison-Knudsen Co., Inc. and Peter Kiewit Sons Co., at Grand Coulee Dam, knows plenty about what sudden shock loads can do to wire rope fastenings. He knows that "x-shock"—the unforeseen blow that engineering can't calculate—can snap cheap clips like so many clothes-pins. "I stick to genuine CROSBY Clips," says Herb. "That drop-forged strength is mighty good insurance!"

That's why industry uses more

CROSBY CLIPS

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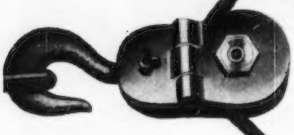
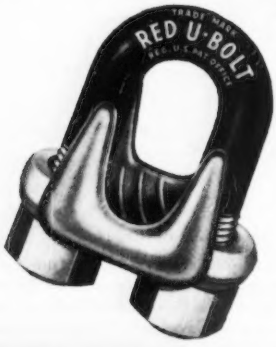


This is the AMERICAN HEAVY DUTY UTILITY SNATCH Block . . . other AMERICAN wire rope blocks from 1½ to 250 tons capacities.



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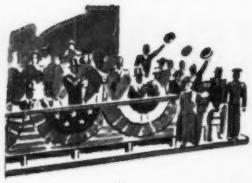

F-15A

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EUCLIDS *Move the Earth*

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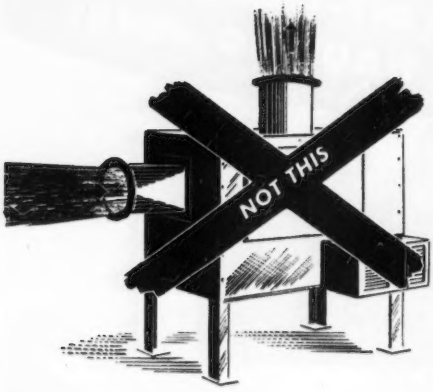

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WHEN dust particles are brought into intimate contact with water, the weight of the particles is increased so even small micron sizes can be removed from an air stream by centrifugal and dynamical forces. The combination of these forces and the proper utilization of water in the collecting function of a dust collector assures—

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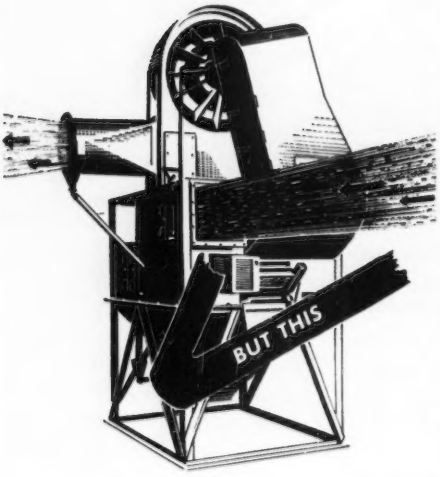

The Type W combines water sprays with dynamic precipitation to impinge and trap the dust particles. The Type N operates by the hydrostatic principle which cleans the air by a combination of centrifugal force and intimate intermixing of water and dust laden air.

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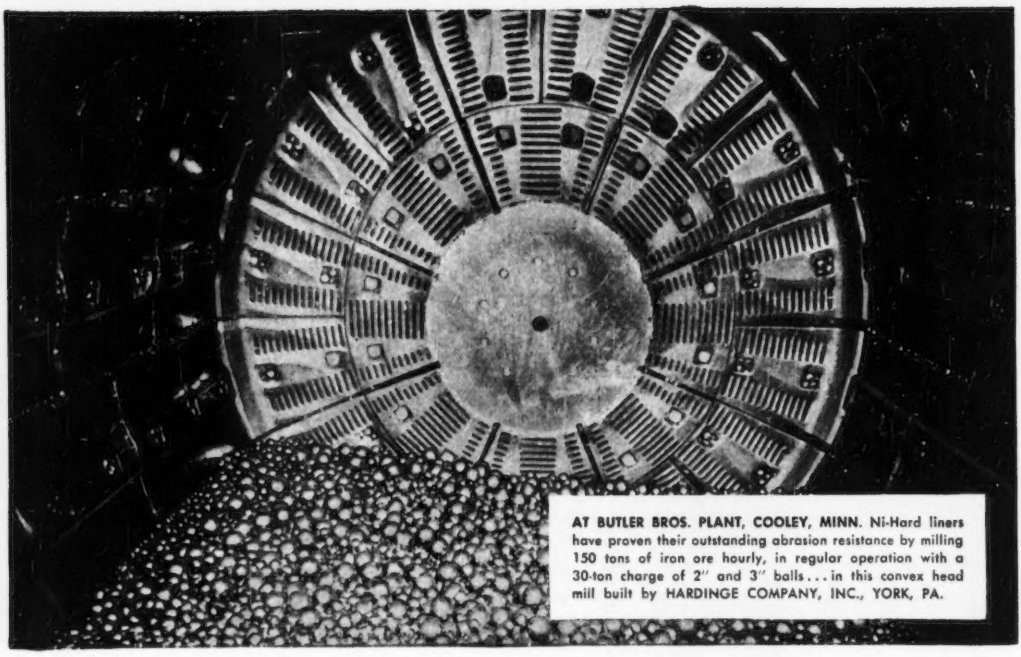

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PERFORMANCE indicates that records set by Ni-Hard in milling other metallic ores will be duplicated.

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FROM 1800 TO 3200 TONS DAILY

IN 1941

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And some 4 million tons later, this famous producer put into operation a

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This action was taken because 9 years of experience has proven that H. H. Sink Float gave

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DUE TO DOWN TIME . . .

Replace Worn or Cracked Metal Tires *with*

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For KILNS

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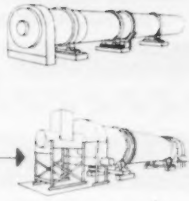

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—for kilns, coolers, dryers, ball mills and similar processing equipment.

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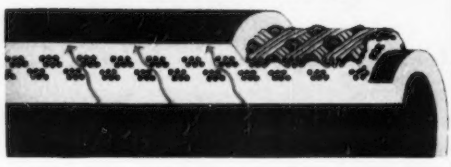
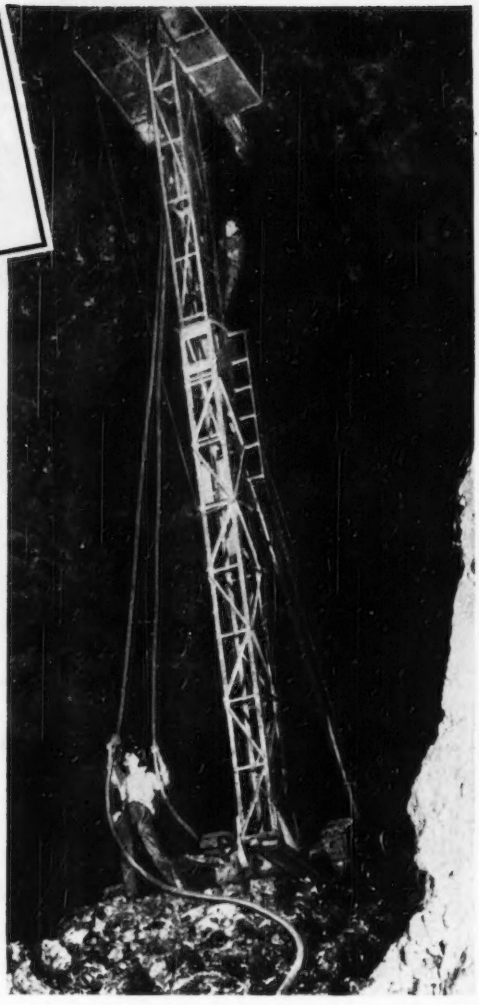
No hose construction has ever been developed to equal Condor Homoflex HEAVY DUTY AIR HOSE and WATER HOSE for flexibility and ability to cushion shock. It's not just a matter of an extra thick cover to withstand the gouges of falling rock and dragging over jagged footings in mines and quarries. The Homoflex "toughness" is more than cover-deep; it is toughness through and through.

HOMOGENEOUS FLEXLASTICS "THROUGH-AND-THROUGH"



The enlarged cross section illustration of the Homoflex Hose wall shows how the cover, strength member, and tube are "fused" into one homogeneous unit. You can't separate any part of this hose from another. It is this construction, with all the sinewy resilience of its strength member embedded in Flexlastics that makes possible lighter weight, extreme flexibility and resistance to kinking, with no sacrifice of safe working pressure.

Ore miners and quarrymen have long called for better hose to take the abuse of falling rock, sharp bends and rough handling. Miners can't "baby" hose. If it doesn't stand up, it is sometimes a risk to safety and always costly to replace. To answer the toughest of all hose problems, Raybestos-Manhattan engineers developed the TWIN TEAM of Condor Homoflex HEAVY DUTY AIR HOSE and Condor Homoflex HEAVY DUTY WATER HOSE.



Here's a Condor Homoflex Air and Water Hose Team suspended from a telescopic mast where a Jumbo drill is taking down roof. Air hose is working at 100 pounds pressure in this Oklahoma zinc mine.

Now, wherever wet drilling is done, this team of Homoflex Air and Water Hose is in demand. If you are not yet using Condor Homoflex Hose on your wet drills, get some from your nearest Manhattan Distributor. It's a good way to end hose kinking or collapsing and assure peak drill production with a constant, full feed of air and water through the hose.

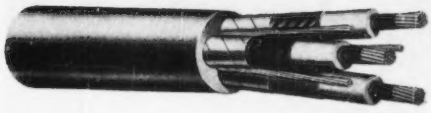
(Condor Homoflex Heavy Duty Air Hose has an oil-proof tube, and is ideal for all other heavy-duty mining, quarrying and construction work).

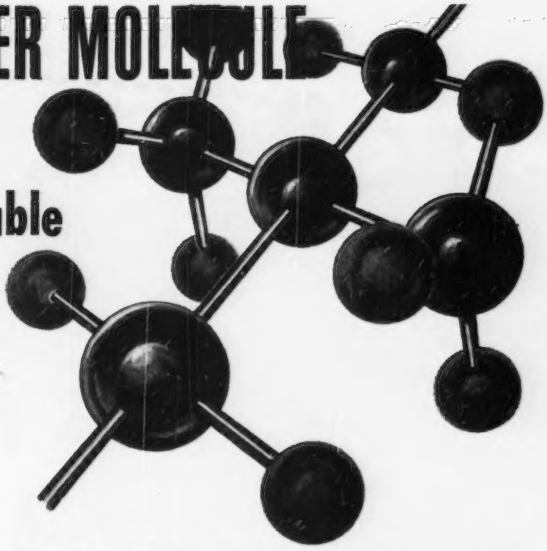
MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

This MADE-TO-ORDER MOLECULE means longer service for G-E mine power cable





Billions upon billions of these man-made Butyl molecules form the basic ingredient of the insulation of General Electric Super Coronol mine power cable—molecules custom-built to assure extra-long cable life even under the most difficult operating conditions. This insulation—actually an improvement on nature—permits Super Coronol cable to offer all these advantages:

OZONE-RESISTANT. Super Coronol cable is ideal for high-voltage installation—to 15,000 volts—wherever there is danger of corona and resulting ozone.

MOISTURE-RESISTANT. Use Super Coronol in conduits, ducts, or directly buried.

HEAT-RESISTANT. Super Coronol provides efficient operation to 80 C.

HIGHLY FLEXIBLE. Even at extremely low temperatures Super Coronol flexes easily.

EXTREMELY STABLE. Super Coronol is highly resistant to oxidation and aging, and to acids, alkalies, and sunlight as well.

LIGHTWEIGHT. In medium-depth borehole installations, Super Coronol cable may be directly suspended by the conductors.

ELECTRICALLY PROTECTED. The conductors in Super Coronol mine power cable are covered with a metallic shield to drain off induced potential charges; ground wires provide a low-resistance ground-return circuit.

MECHANICALLY PROTECTED. Jacketed with tough, smooth Geoprene, Super Coronol cables take abrasion in stride, may be re-used in other locations as requirements change.

Cable replacement costs go down in a hurry when you specify General Electric Super Coronol cables. You can't afford to ignore these savings. For further information, consult your local G-E Construction Materials Distributor or cable specialist. Section W22-1195, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

COMPARE—and be convinced!

These figures, comparing Super Coronol insulation with ASTM and IPCEA requirements, show conclusively the superior physical and electrical properties of this cable.

PHYSICAL PROPERTIES

	IPCEA AND ASTM REQUIREMENTS	SUPER CORONOL (Typical Values)
Original		
Tensile strength, lb/sq in.	450	750
Per cent elongation	250	600
Set in 2-in. test piece in.	½	3/16
After 7 days in geer oven at 70 C		
Tensile strength, lb/sq in.	400	700
Per cent elongation	200	525
After 48 hours in oxygen bomb at 70 C		
Tensile strength, lb/sq in.	400	675
Per cent elongation	200	525
Cold bend	—10 C	—10 C†
Ozone resistance	3 hours	excellent††

ELECTRICAL CHARACTERISTICS

Insulation resistance		
K value	5280	15000 and up
Power factor, per cent	5	1

†Can be installed at temperatures down to —40C

††Many samples have shown no signs of depreciation after 72 hours' exposure.

Look to G-E wire and cable for continuing progress toward
MORE TONS
PER MACHINE PER DAY
Investigate these famous G-E cables for better returns in mining operations:
Mine power cable insulated with Super Coronol* . . . Versatol*-Geoprene cable . . . Geoprene portable cable . . . Bore hole cable . . . Varnished cambric cable . . . Locomotive cable . . . Flamenol* mine telephone cable . . . Shot firing cord . . . Deltabeston* cable and magnet wire.
*Registered Trade Mark of General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

New LORAIN Stripping Boom *Casts Higher and Farther*

Here's a new Lorain shovel with a "boarding house reach"! It's the big Lorain-820 . . . with a 34-ft. boom and a 27-ft. stick with 1¾ yard dipper. It's Lorain's answer to the strip miners' needs for a shovel that will cast material onto higher spoil banks . . . dig higher overburden and handle wider cuts. Those advantages add up to lower cost-per-yard stripping.

In addition to the new, long shipping boom, Lorain-820's offer strippers other important performance advantages . . . the shock resisting hydraulic coupling . . . mobile 2-speed crawlers. The "820" is in a class all by itself, for stripping jobs.

Get the story on the new, long reaching boom from your Thew-Lorain Distributor soon. It's the "boom" for bigger profits.

THE THEW SHOVEL CO. • LORAIN, OHIO

820 FEATURES FOR STRIPPING

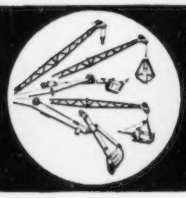
GREATER RANGES...
34-foot boom . . . 27-foot stick . . . 1¾-yard dipper.

NO-SHOCK PERFORMANCE...
No engine stall, no machinery shocks, no engine loafing.

GREATER EFFICIENCY...
Applies power directly—(a) Concentrated on any one operation, or (b) Spreads power for high speed simultaneous operations.

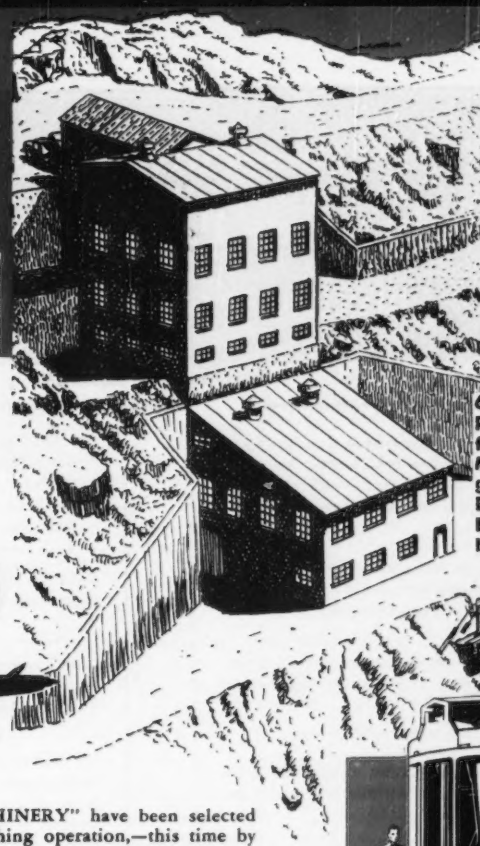
BETTER MOBILITY...
Independent crawler 2-speed travel in both directions, climbs 30% grades, chain drive, steers either direction, oil-enclosed mechanism.

THEW **LORAIN**®
on CRAWLER or RUBBER



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

Another prominent group selects NORDBERG *throughout*



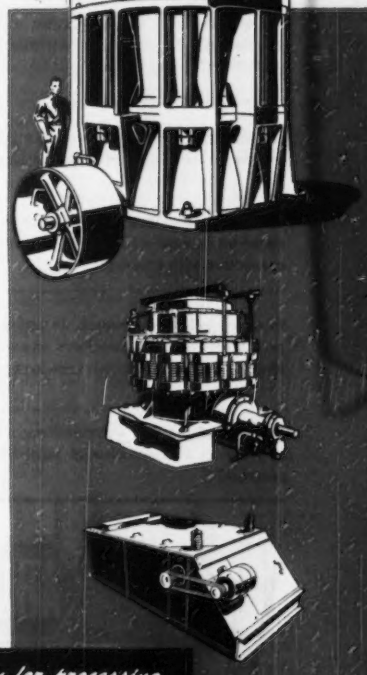
6000-Ton-Per-Day Rock Crushing Plant for Preparation of Mine "Backfill" Aggregate at Kandilli District Operations of Ereğli Kömürleri Istihsal, Zonguldak, Turkey

NORDBERG "KNOW-HOW and MACHINERY" have been selected again for an essential and important crushing operation,—this time by E. K. I., of TURKEY, the predominant Coal Mining group whose extensive workings in the Zonguldak Coal Basin on the North Coast of Turkey, overlooking the Black Sea, are being modernized and improved through a vast mechanization and electrification program to double the annual coal output of the country.

An unusual feature of this undertaking is the plant which is being provided to reduce the hazard of spontaneous combustion and dreaded black damp,—through hydraulic backfilling of the spent workings.

To assure an adequate and steady flow of "backfill" aggregate, a completely NORDBERG-equipped plant to produce 6,000 tons per day of "finely crushed hard rock" is being installed. This involves PRIMARY and SECONDARY CRUSHERS, SCREENING UNITS, a well designed materials handling system with provision for surge and feed control, and adequate facilities for servicing and maintenance of equipment. The basic Crushing Plant units include a *30" Nordberg Heavy Duty Primary Gyratory Crusher, two 4¼' Symons Cone Crushers, and two 5'x8' Symons Rod Deck Vibrating Screens.*

For large or small operations,—whether such be mineral reduction, base or precious metals, public works projects, or commercial aggregate production—you can depend on NORDBERG EQUIPMENT to deliver maximum output at lowest possible cost.



NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN

NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
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M506

NORDBERG *Machinery for processing ores and industrial minerals*

Primary Crushers

Vibrating Bar Grizzly

Symons Rod Deck Screen

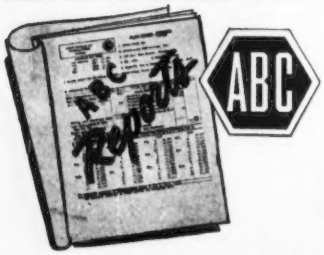
Grinding Mills

Mine Hoist

Diesel Engines

Advertisers—How does your selection of Business Papers as advertising media score on this test?

QUESTIONS	YES OR NO	COMMENTS
Does your selection of media start on a basis of facts; namely, has the circulation been audited by an accepted authority in accordance with standards approved by leading advertisers and agencies?		The Audit Bureau of Circulations, an association of 3300 advertisers, agencies and publishers, provides standards and methods for auditing the circulations of published media. All publications that can meet A.B.C. standards are eligible for membership.
Paid subscriptions as indication of reader interest. Do you take this factor into consideration in evaluating the circulations of business papers?		A.B.C. Audit Reports give the average circulation, both paid and unpaid, for the period covered by the report.
Does your consideration include an audited breakdown of the subscribers by occupation and kind of business?		A.B.C. business paper reports show the vocational identity of subscribers and tell how much of the circulation goes to the specialized markets in which you are interested.
Do you compare the geographic distribution of the circulation with your sales activities and market potentialities?		For business papers in the U. S., A. B. C. reports give a breakdown of subscribers by states—for Canadian papers by Provinces—thus making it possible to compare coverage with analyses of sales and with distribution of other publications.
In evaluating media, do you take into consideration the channels through which the circulation is obtained?		A.B.C. reports show how many subscriptions were received by mail direct from subscribers, how many from catalog agencies, publisher's own and other field-selling organizations.
Do you check to find out how much, if any, of the circulation is sold at special reduced prices; or in connection with premiums?		When special reduced prices or premiums are used in obtaining subscriptions, A. B. C. reports show what these prices and premiums are and the number of subscriptions thus obtained.
In selecting business papers, do you check to see what percentage of the subscribers express continued interest in the publications by renewing their subscriptions?		A.B.C. reports for business papers give the percentage of renewals based on the number of expirations during a 12-month period and the renewals received within 6 months after expiration.
Do you study a paper's circulation growth over a period of years as an indication of publishing stability and progress?		A.B.C. reports show quarterly averages of the net paid circulation for the period covered by the report and for 3 years previously.



When you buy advertising space with the help of the factual information in A. B. C. reports you make sure of maximum value for your advertising dollars. This business paper is a member of the Audit Bureau of Circulations. Ask for a copy of our A. B. C. report and then study it.

McGRAW-HILL publications

A.B.C. REPORTS — FACTS AS THE BASIC MEASURE OF ADVERTISING VALUE

CUT COAL COST 4/10¢ PER TON in Shuttle Car Sections

with Battery-Powered Shuttle Cars

Battery-powered shuttle cars have the following advantages demonstrated and proved:

SAFETY

Only battery cars are "permissible"

PRODUCTION

Can produce 10% more tonnage
Deliver more tons per man shift
Give 22% more ton-miles per shuttle car haur

PERFORMANCE

Include all design advances
Travel 25% faster
Discharge 30% faster
Are more dependable and predictable
Handle supplies easier
Reduce shuttle car change time
Can gob underground
Promote section efficency

COST

Equal capital cost
Produce coal in shuttle car sections for approximately ½c less per ton** —in hand-loaded sections, as much as 75c a ton

**Shuttle Car Haulage, AIME, Technical Publication No. 2198.

A "MUST" FOR CONTINUOUS MINING MACHINES

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

AND . . .

Two-shift operation is now possible with only one set of batteries.

Independent studies* have proved conclusively that battery-powered shuttle cars cut coal mining costs by nearly one half cent per ton in shuttle car sections. The studies cover first costs as well as operating costs, maintenance, power, labor, supplies, amortization, fees, royalties, taxes, etc.

In hand-loaded sections, battery-powered shuttle cars have cut costs 75 cents per ton and more.

Even more startling evidence of the superiority of battery cars is contained in the results of 95 published time studies made in mines from Pennsylvania to Illinois. Look at these proven facts: battery-powered shuttle cars travel 25% faster . . . discharge 30% faster . . . do 22% more work . . . can produce 10% more tonnage!

In other words, battery power is the proven low-cost power for shuttle cars. The bulletin, "A Report of Mine Shuttle Car Operation Based on 95 Published Time Studies," is free on request. Send for your copy TODAY. Address Dept. M-129.

*AIME Technical Publication No. 2190, May, 1947

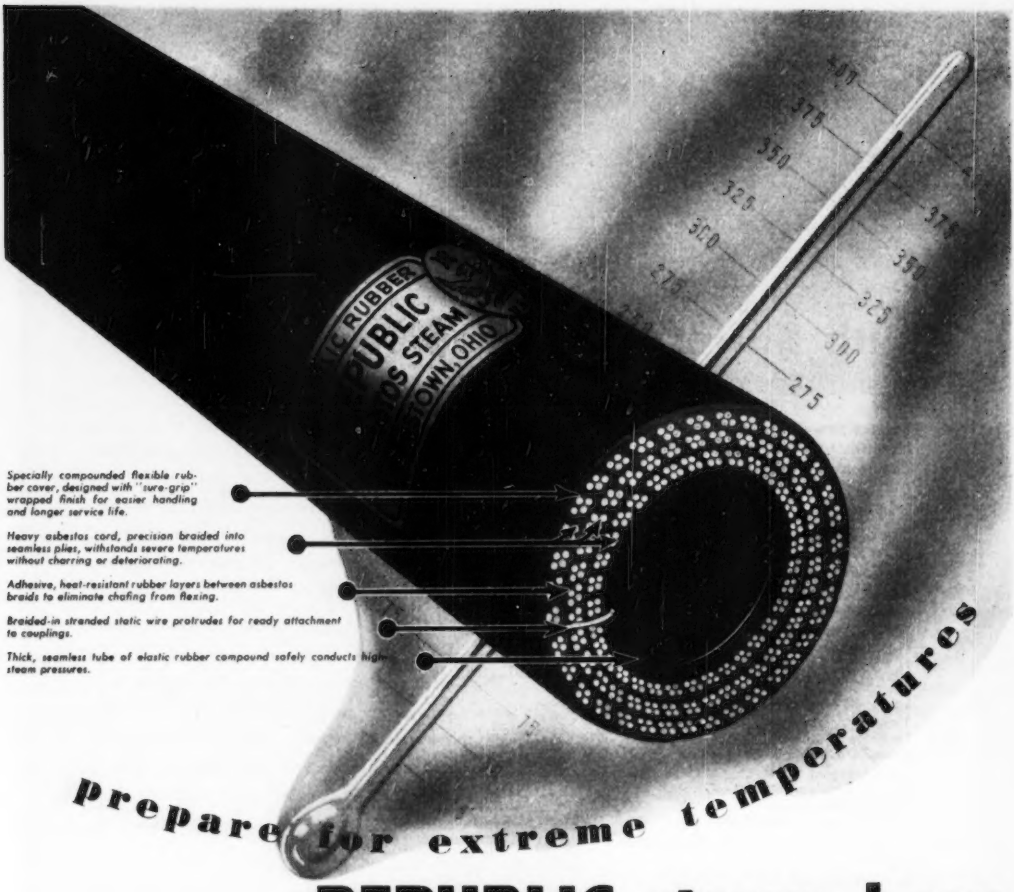
GOULD

STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC.*
TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

*Formerly Gould Storage Battery Corporation


Specially compounded flexible rubber cover, designed with "sure-grip" wrapped finish for easier handling and longer service life.
Heavy asbestos cord, precision braided into seamless plies, withstands severe temperatures without charring or deteriorating.
Adhesive, heat-resistant rubber layers between asbestos braids to eliminate chafing from flexing.
Braided-in stranded static wire protrudes for ready attachment to couplings.
Thick, seamless tube of elastic rubber compound safely conducts high steam pressures.
Prepare for extreme temperatures

REPUBLIC steam hose

● Republic's braided Asbestos Steam Hose carries high pressure steam with safety and economy.

It's made to handle pressure up to 200 pounds without charring and for use on all jobs where continuous service and dependability are important to success.

Republic Asbestos Steam Hose has seamless rubber steam channels, surrounded by multiple plies of precision-braided asbestos cord.

Thick layers of specially compounded insulating rubber protect each ply against internal chafing.

Republic Asbestos Steam Hose is built with tough, flexible outside covers that resist abrasion. The special "sure-grip" cover design makes the hose easy to handle; less dangerous underfoot.

Contact your local Republic Distributor or write direct for more information about this super-duty steam carrier.

Asbestos Steam Hose is available in standard fifty-foot lengths, ready to go to work on your toughest job. And, don't forget the many other products and services available at Republic Rubber, for nearly a half century, the specialist in the field of industrial rubber.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

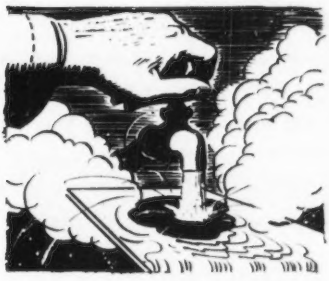
How to reduce your grease inventory and get better lubrication

UNOBA

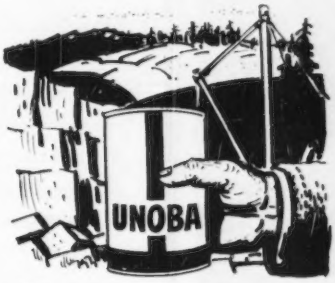
1. Mining and plant superintendents throughout the West are proving that you can actually concentrate much of your grease inventory to multi-purpose UNOBA—and get *better* over-all lubrication performance, under all kinds of *heat* and *water* conditions.

2. For example, a California onyx and marble company,* faced with extreme heat, dust and moisture conditions similar to mine operations, reports UNOBA as outstanding for the lubrication of large crankpin bearings on gang saws. And this firm now uses UNOBA for its *entire* plant lubrication.

**Name available upon request*



3. Just what is UNOBA? It's a *barium* base grease that assures proper lubrication under the most *severe* conditions. It sticks to metal surfaces with a tenacity that boiling water can't break! And it gives thorough protection at temperatures from below freezing to over 300 degrees F.



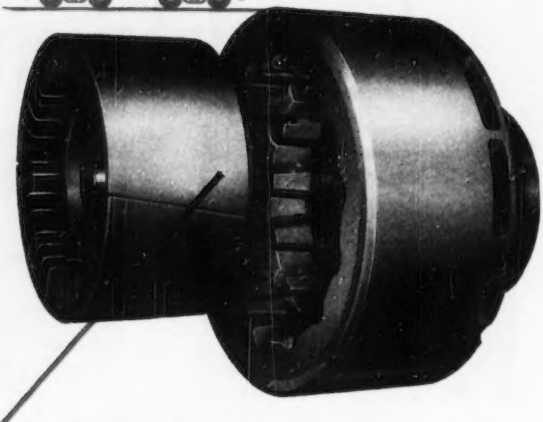
4. Because of this flexibility, multi-purpose UNOBA *simplifies* lubrication. It performs on jobs formerly requiring *many* different types and brands of grease. And this results in reduced inventories, smaller storage space, less chance of using the wrong lubricant, and *lower* maintenance costs.

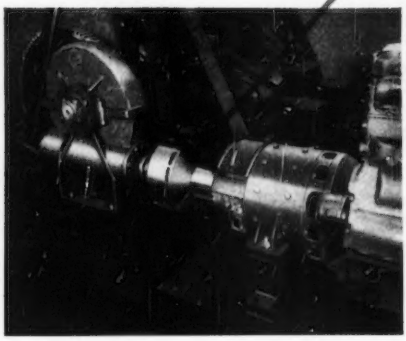
Let your Union Oil Representative tell you the complete UNOBA story, or write Sales Dept., Union Oil Company, Los Angeles 17, Cal.

76 UNION OIL COMPANY OF CALIFORNIA

NOW AVAILABLE ON **BROWNHOIST** LOCOMOTIVE CRANES . . .

new dyna-matic clutch





For Smooth, Acceleration, and Control of Hoist, Rotating and Travel

The new, electrically operated DYNAMATIC CLUTCH, available only on Brownhoist locomotive cranes, provides a smooth, responsive flow of power never before possible with the usual disc or mechanical clutch for transmitting power to the machinery of a crane. The DYNAMATIC CLUTCH is essentially a driven rotor revolving on anti-friction bearings within a rotating coil energized by a small flow of current from the starting battery. The new DYNAMATIC CLUTCH has a 32-step control. Power response is steady and sensitive. Loads may be raised, lowered, or rotated smoothly and accurately without the use of mechanical brakes. Torsional impulse and vibration from the power source is completely eliminated. The DYNAMATIC CLUTCH provides a cushion between the engine and crane machinery. When clutch is fully engaged there is no appreciable slippage. Since there is no contact between the revolving field and armature, there is no friction between moving parts nor drag between the parts when the controller is in the off position — no parts need replacement other than inexpensive brushes. The new DYNAMATIC CLUTCH is one more good reason it pays to buy a BROWNHOIST.

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BROWNHOIST

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, San Francisco, Chicago, Canadian Brownhoist Ltd., Montreal, Quebec. **AGENCIES:** Detroit, Birmingham, Houston, Los Angeles, Portland, Seattle, Spokane.

get more E.P.* per dollar!

XR50-8

*Explosive Power is what you pay for when you buy explosives. You get more E.P. for your dynamite dollar with Hercules Hercomites® and Gelamites® because these explosives not only give better breakage than older-type explosives, but are more economical to use than extra dynamites and gelatins. And there's a series for practically every mining, quarrying, and construction need.

"Hercomites," for example, come in fast, intermediate, and slow heaving-action types. One series is especially designed for poorly ventilated places. All offer improved water resistance and, like "Gelamites," come in handy Tamptite® cartridges. For full information, write for illustrated booklet, "Hercomites and Gelamites for Lower Blasting Costs."

HERCULES POWDER COMPANY
INCORPORATED
933 King Street, Wilmington, Delaware

*BIRDSBORO-BUCHANAN CRUSHERS...

• These rugged crushers have made a great name for themselves in speeding ore production on the Iron Range. The two shown here are 30″x 42″ Type C All Steel Sectionalized Jaw Crushers with split flywheels, designed and built by Birdsboro to facilitate assembly of the crushers underground.

Regardless of the size limitations of your shaft or skip, Birdsboro-Buchanan can design, construct and supply you with a crusher to suit your specific requirements. For primary crushing above or below ground, put your problems up to Birdsboro-Buchanan engineers.

PATENTED OFFSET TOE LUGS— THAT NEVER WEAR OFF

A patented Birdsboro development, made of high strength cast alloy steel and installed on swing jaw and front head to give jaw plates up to 100% more life and a 50% reduction in maintenance costs. Crushers also equipped with automatic lubricating system.

BIRDSBORO
STEEL FOUNDRY & MACHINE CO.
Birdsboro, Penna.

Designers and Builders of:
Crushing Machinery • Rolls • Steel Mill Machinery
Hydraulic Presses • Special Machinery • Steel Castings

BIRDSBORO BUCHANAN JAW CRUSHERS

Canadian Representative & Manufacturer
JOHN INGLIS CO., LTD.
TORONTO, CANADA

World-Wide Agent Representation. Contact home office for nearest representative.

Stand-Up Stamina

SUSTAINED EARNING POWER—*that's Mack*

• Wherever there's earth or rock to be moved...wherever there's need for *extra* performance, *extra* stamina, *extra* dependability—there you'll find a job that's made to order for a Mack.

Mack's proved superiority in earth moving work rests on ***built-in superiority*** of design and construction. In addition to their inherent power, strength and durability, Mack trucks bring you outstanding advances in maneuverability, ease of control, positive traction and maintenance accessibility.

Follow the lead of profit-wise operators who have discovered from actual experience that when it comes to working harder, lasting longer and operating at lowest cost—there's nothing to equal a Mack. Your nearest Mack branch or distributor will give you the full story on what Mack's *sustained earning power* can mean to you in greater profits through greater output at lower cost.

Be Profit-Wise

Modernize with

Mack
TRUCKS

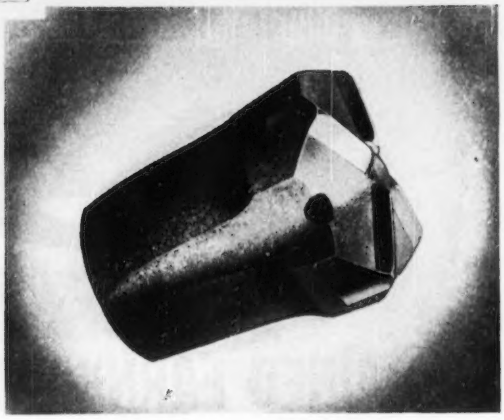
8416

...outlast them all

Mack Motor Truck Corporation, Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Holbits — From start — to finish with ONE STEEL!

REGISTERED TRADE MARK



Cross Type Holbit for general-purpose drilling. For fast cutting in soft formations, there is the Chisel Type Holbit. Both are available in many sizes from 1⅛ ins. to 2 ins., and in three grades of tungsten carbide.

HOLBITS have now been used on a world-wide scale long enough for it to be possible to form a sober estimate of their value. The difficulty is to speak modestly about the Holbit, when from all parts of the world come enthusiastic reports of faster drilling, increased blasting efficiency, easier work, less drill-sharpening and steel-changing, and all-round saving of time and money. In face of these reports—which satisfactorily corroborate the findings of the Holman Research Department after many months of intensive experimental work and practical tests—it may be advisable to reiterate some of the plain facts about Holbits.

HOLBITS, then, are tungsten carbide tipped rock-drill bits which will drill a very considerable footage before redressing is necessary, and redressing is no more than a touch-up on an abrasive wheel. Wear on the reaming edge of a Holbit is negligible, thus ensuring a parallel hole. Hence higher drilling speeds, fewer steel changes and more effective blasting. Particularly in combination with the Holman Airleg and Handrils, also Long Cradle Drifters, the Holbit makes "one-steel-per-hole" a working possibility. For full details and working instructions, send for a copy of "Holbits."

The first name for lasting service

Holman BROS. LTD.
CAMBORNE . ENGLAND
TELEPHONE: CAMBORNE 2275 (7 LINES)
TELEGRAMS: AIRDRILL, CAMBORNE
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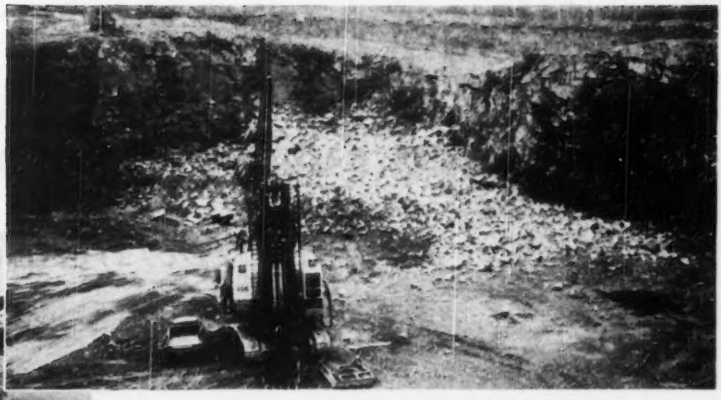

Face showing loading operation. Drill holes approximate 85 feet, 9¼ inches in diameter. Burden averages 21.5 feet, spacing 26 feet.

Close-up of typical loading operation. "Nitramex" No.2, especially developed for bottom loading, gives additional strength needed to break hard-rock toe.

Wires are attached to Du Pont Blasting Timer set at .020 interval. Rotational firing creates a peeling action that reduces vibration and improves fragmentation. Secondary blasting is held to a minimum.

DAY-TO-DAY BLASTING PROVES ECONOMY OF DU PONT "Nitramex" No.2

Helps improve fragmentation . . . reduce secondary blasting

Operators of the Benson open pit Magnetite iron ore mine of the Jones and Laughlin Ore Co., Star Lake, N. Y., are using Du Pont "Nitramex"* No.2 in routine blasting operations. Their experience has proved the economy and efficiency of this blasting agent for better fragmentation and reduced secondary shooting.

The effective blasting plan adopted for a typical and difficult toe condition calls for bottom loading of "Nitramex" No. 2. This new-type blasting agent readily breaks up tough bottom rock. Its high density and slow pressure development result in a powerful spreading action . . . permit increased spacing, reduce drilling and blasting costs.

"Nitramex" No.2 retains all the safety characteristics of Du Pont "Nitramon."** It cannot be detonated by friction, falling objects, or even the impact of ball ammunition. But like "Nitramon," it is dependably detonated with a "Nitramon" Primer, itself relatively insensitive.

The remainder of an average load consists of Du Pont "Nitramon" and "Nitramon" Primers connected by Primacord and detonated with Du Pont Electric Blasting Caps. Split-second blasts, with the Du Pont Blasting Timer set at intervals of .020 second, peel the rock from the face, giving excellent fragmentation.

Ask your Du Pont Explosives representative to explain how "Nitramex" No.2 may help you to do a more efficient, more economical job of blasting. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

*Reg. trade-mark for ammonium nitrate blasting agent
**Reg. trade-mark for nitrocarbonitrate blasting agent

DU PONT "NITRAMEX" No. 2

Not currently for sale in western states

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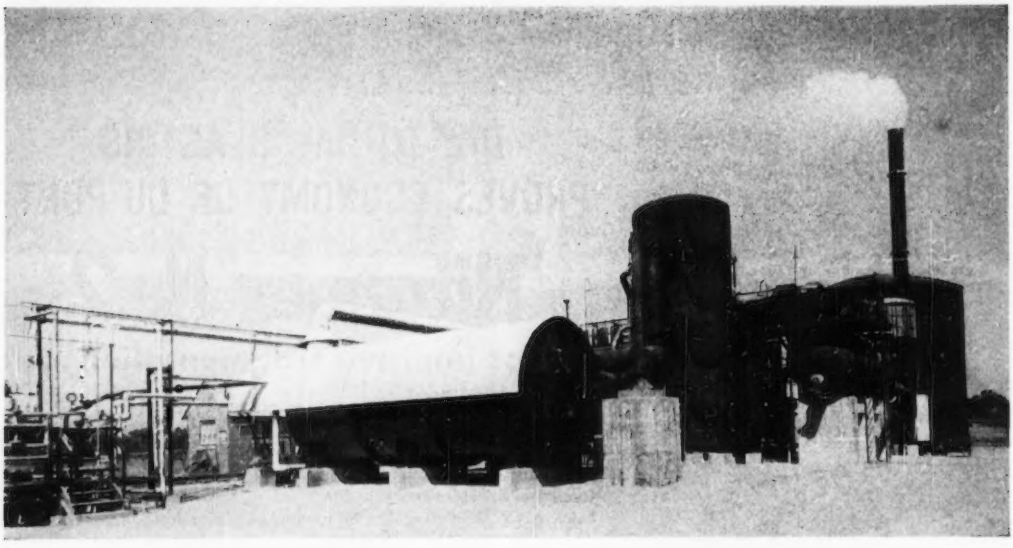
now in operation



The first plant, utilizing Chemico's new process for making sulfuric acid from sulfur, is now in successful operation at the Hamilton, Ohio works of the American Cyanamid Company. This new unit—rated at 50 tons per day can deliver sulfuric acid of any strength up to 95% H_2SO_4.

This new-type Chemico plant is basically simpler than conventional type contact sulfuric acid plants. The new process differs in these basic ways.

- It converts SO_2 to SO_3 in a highly efficient quench converter. This eliminates heat exchangers . . . assures higher yield from raw sulfur . . . virtually eliminates contamination due to unconverted SO_2.
- From the converter, the SO_2 gas mixture passes through a multiple dip-pipe absorption system, which operates by gravity flow. There is no need to distribute acid over packed absorbing towers.
- Water evaporation from absorber acid solutions removes heat of absorption and the sensible heat of hot gases. Only a small amount of cooling water is required for the product acid before storage.
- A built-in Pease-Anthony Venturi Scrubber insures mist elimination in the exhaust stack.
- Seven major items of equipment — usually found in present-type contact acid plants — have been eliminated: drying tower, gas filter, heat exchanger, SO_3 cooler, acid coolers, acid circulating and transfer pumps and diluting equipment.

THE RESULTS — The new-type plant is much smaller. It can be economically built and operated. Investment cost is lower per ton of capacity. Startup, shutdown and operation are easier. CC 207

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These are actual Case Histories

CASE HISTORY No. 1

With a New Bulldog Hammermill crushing 20" and under Fuller's Earth, 50% Moisture

Before	After
Operation required one primary double roll, 8 screens, two secondary double rolls, with auxiliary equipment. Continuous clogging, produced irregular finished product, consumed excessive fuel in drying, extruding operations expensive.	Installing one Bulldog Hammermill. One stage operation, no clogging—no delays or shut-downs. Now produces a uniform cubicle product easily dried, saving fuel. Saves labor, maintenance, fuel and produces a better finished product.

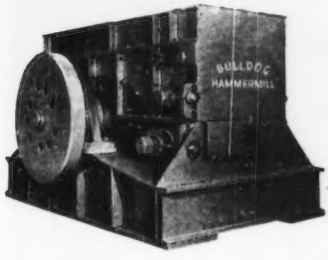
Second Hammermill Purchased as a Result of Savings

CASE HISTORY No. 2

Rebuilding an existing operating Hammermill Crushing Limestone for cement

Before	After
Maintenance required replacement of 26,400 lbs. of manganese steel hammers and 12 sets of hammer bolts annually. Load capacity required extra operating hours. Primary grinding was not suitable for final roll type pulverizer.	With Bulldog rebuilding, the Hammer replacement was reduced to 3,600 lbs. manganese steel and one set of hammer bolts per year. Capacity increased 30% with less power consumption, better finished product saving power and maintenance in roll type pulverizer.

CAN YOU CUT COSTS - INCREASE CAPACITY - IMPROVE PRODUCT



with a

New Bulldog Hammermill

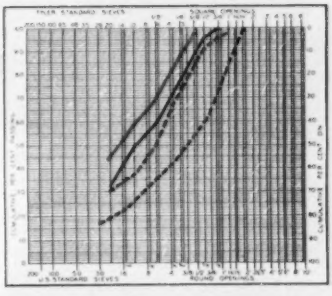
Compare your crushing operation with the actual proven results charted at right.

SOLID RED LINE indicates material from Bulldog Hammermill with screens in closed circuit.

DOTTED RED LINE shows Bulldog Hammermill no screens, open crushing.

SOLID BLACK LINE indicates standard impactor with screens in closed circuit.

DOTTED BLACK LINE indicates standard hammermill no screens, open crushing.



Bulldog Hammermills with Non Clog *Moving Breaker Plate* for sticky or high moisture materials or with *Stationary Breaker Plate* for dry materials are built in all sizes up to 72" x 60" for primary, secondary, and fine reduction. Write for complete details.

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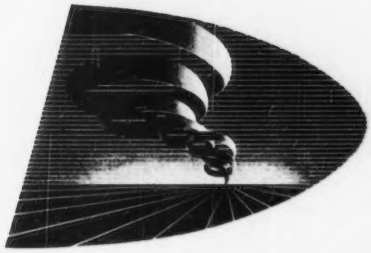

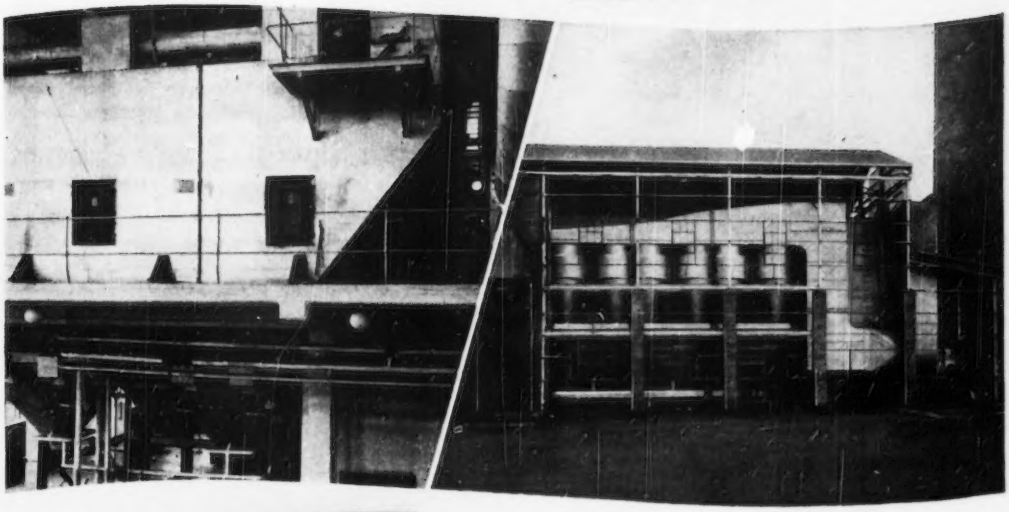

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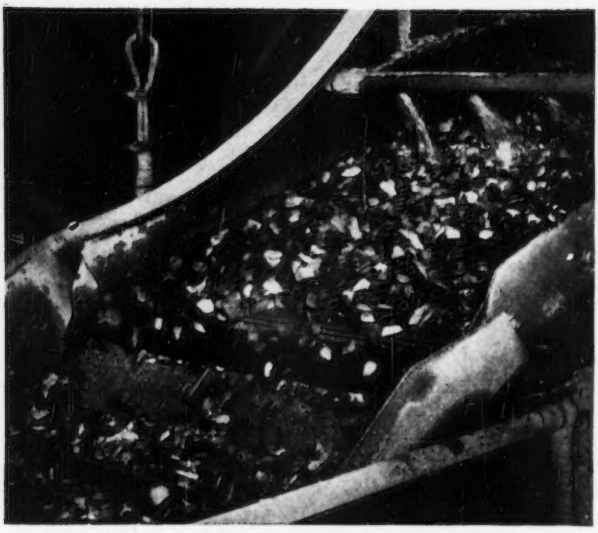

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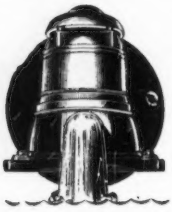

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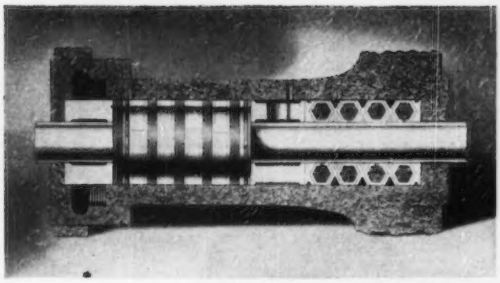

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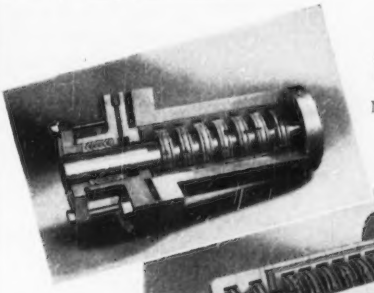

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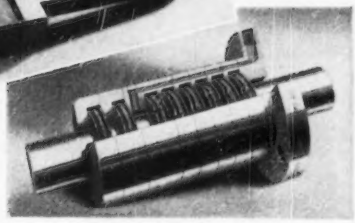

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Of Engineering and Mining Journal, published monthly at Chicago, Illinois, for October 1, 1950.

1. The name and address of the publisher, editor, managing editor, and sales manager is: Publisher: McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York, N. Y.; Editor: Evan Just, 330 West 42nd St., New York, N. Y.; Managing Editor, A. H. Hubbell, 330 West 42nd St., New York, N. Y.; Sales Manager, R. W. Davis, 330 West 42nd St., New York, N. Y.

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[SEAL] ELVA G. MASLIN

(My commission expires March 30, 1952.)

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ANYTHING within reason that is wanted in the field served by Engineering & Mining Journal can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WANTED

Rock Crushing and Milling Manufacturer requires graduate Engineer for production work. Industrial experience in crushing and milling essential. Mechanical aptitude desirable. Applicant to include all details and salary desired in first letter.

P7942, Engineering & Mining Journal
330 West 42nd St., New York 18

WANTED

Immediately for base metal mine, Bolivia, Chief Engineer. Some knowledge Spanish advisable but not essential. Would consider recent graduate with some background operating experience.

Standard three-year contract, travelling expenses both ways.

Starting salary $3,300—annually up, depending on experience.

P8082 Engineering & Mining Journal,
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Contractor with excellent equipment and experienced personnel interested in excavating, material handling, or open pit mining work.

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WANTED

Large engineering firm wishes to acquire several complete plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment whole or in part. Personnel retained where possible, strictest confidence

Box 1231, 1474 Broadway, New York 18, N. Y.

WANTED

ONE 5x10 or 6x12 MARCY open end rod mill, complete with motor, 440 volt, 3 phase, 60 cycles.

ONE 7-FOOT DORR duplex classifier, FH or FXDF, complete with motor, 440 volt, 3 phase, 60 cycles.

W 7830, Engineering & Mining Journal,
330 W. 42nd St., New York 18, N. Y.

WANTED

One or more 35 to 45 ton Diesel-mechanical or Diesel-electrical locomotives. Davenport or similar. 0-6-0 type, preferably narrow gauge for conversion to our 27¾" track. When quoting please state make, age, serial number, make and horsepower of motor, location and enclose blue prints. Airmail offers to P. O. Box 1348, Havana, Cuba.

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Especially Adaptable for MINE USE

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● Also SERVICE MANUAL & PARTS CATALOG

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Slushers (drag) hoists—air and electric—2 drum and three drum
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Thickeners—Ball mills—jawcrushers
Rolls—Filters

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420 School Street, Joplin, Missouri

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No lengths too long or too short.
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by the makers of the
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Since 1873
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1—2" Denver Vertical Sand Pump.
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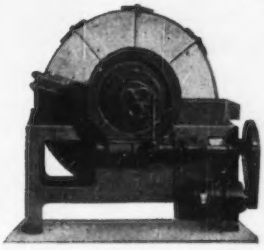
1—4" Allen-Sherman-Hoff.
1—1" Denver Vertical Sand Pump.
2—4" Wilfley Sand Pumps.
2—6" Wilfley Sand Pumps.
6—CP-2 Chicago-Pneumatic Air Driven Rotary Sump Pumps.
1—Pomona 7, 17 Stage, Deep Well Turbine.
5—1" New Ingersoll-Rand Motor Pumps.
1—2" Duriron Acid Resistant Centrifugal.
1—3" Goulds Enclosed Centrifugal Pump.
1—4" x 4" American Centrifugal Sludge.
5—5" Ingersoll-Rand Centrifugal Motor
1—2" Ingersoll-Rand 2-Stage Motor Pump.
3—2½" Pennsylvania 4-Stage Centrifugal.
4—3" 6-Stage United Centrifugal Pumps.
2—6" 8-Stage Manistee Centrifugal Pumps.
1—2½" Krogh Centrifugal Sinking Pump.
2—5" Byron-Jackson Portable Pumps driven by Buda gas engines, trailer mounted on two pneumatic tires.
1—6" x 10" Deming Horizontal Double Acting Power Pump.

BLOWERS

1—Buffalo 6 Exhauster, 15 HP motor.
1—Acme 80 Type AE Exhauster.
3—250 D.F.C. Pressure Blowers.
1—6" x 20" Rotary Positive Pressure Blower.
1—6½" x 22¾" Roots Rotary Positive Pressure Blower.
1—8½" x 29¾" Roots Rotary Positive Pressure Blower.
1—10" x 18" New Sutorbilt Rotary Positive Pressure Blower.
1—24" x 18" Roots Rotary Positive Pressure
4—Mueller New Volume Blowers, 24-SR.

CLASSIFIERS

1—48" x 2'6" Atkins Spiral Classifier, high weir type.



3—St. Joe Type Hydraulic Classifiers, 10 cells, 20 spigots.

FILTERS

1—3' x 4' Oliver Drum Filter.
1—4' x 1' Disc Oliver Filter.
2—6' x 2' Disc American Filters.

JAW CRUSHERS

3—4" x 6" New Morse Jaw Crushers.
2—8" x 8" Universal Semi-Steel Crushers.
1—8" x 24" Rogers Cast Steel Crusher.
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1—8" x 36" Universal All-Steel Crusher.
1—9" x 30" Cedar Rapids.
1—15" x 28" Pacific All Steel Crusher.

Just Purchased Gilt Edge Mines, Inc., Deadwood S.D., Complete Mining, 150-Ton Mill Equipment, and Cyanide Plant. Send for detailed inventory.

TUGGER HOISTS

1—I.R. Utility Air Hoist, single drum, Model EI.
1—I.R. "Little Tugger", single drum, Model 6 HC.
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1—Sullivan RH 5 11P Single Drum Electric Slusher Hoist.
1—Sullivan RH 7½ HP Single Drum Electric Slusher Hoist.
2—I.R. Size 10T, 7½ HP Single Drum Electric Slusher Hoist.
1—I.R. Size 5NN-011 5 HP Double Drum Electric Slusher Hoist.
1—I.R. Size 29-MNM-2D 20 HP Three Drum Electric Slusher Hoist.
1—Sullivan Model B-211 25 HP Double Drum Electric Slusher Hoist.
3—Sullivan Type HE 6½ HP D.C. Single Drum Electric Hoists.
9—Sullivan Type HDE6½ HP D.C. Double Drum Electric Hoists.

LOCOMOTIVES

2—1½ ton Mancha "Little Trammer" battery, 18"-24" gauge.
2—2½ ton Mancha battery, 18"-24' gauge.
1—2½ ton Whitcomb battery, 24" gauge.
2—5 ton Westinghouse battery, 24"-36" ga.
2—7 ton General Electric battery, permissible type, 36" gauge.
2—8 ton General Electric battery, 36" ga.
4—10 ton Atlas battery, 36" ga.
3—6½ ton General Electric Trolyers, 36" ga.
2—18 ton Davenport Steam Locomotives, 1—18" and 1 standard gauge.
1—3 ton Whitcomb Gas, Eng. driven, 18" ga.
1—3 ton Ruth Gas Eng. driven, 18" ga.
1—3"x16" Porter compressed air, 18" ga.
1—5½"x16" Baldwin compressed air 30" ga.

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We carry a large stock of air dried redwood lumber and can make up any size tank to order.

BETTER MACHINERY—IT'S FULLY RECONDITIONED

ESTABLISHED 1898

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Rotary Kilns—6½' x 70' & smaller. One 9' x 170'.
Rotary Dryers—3' x 30'—4' x 30'—6' x 40'—5½' x 50'— 6½' x 60'—8' x 70'—7' x 60'.
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Fuller-Lehigh Mills—22"—47" & 52"—Bradley Mills.
Jaw Crushers—From 10" x 6" up to 38" x 24".
Crushing Rolls—From 16" x 10" up to 72" x 20".
1—Complete Linel Hydrating Plant.
Sturtevant Rotary fine crushers—No. 0—No. 1—No. 1½ and No. 2
Ring Roll Mills—Sturtevant No. 1—No. 2.
15'—16' & 18' Herreschoff furnaces.
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Magnetic separators—jigs—screens—classifiers and thickeners.
5', 6' & 7' dia. Rod Mills.
Mine Hoists.
Ore & roll Raymond Mill, low side.
8' x 10'—8' x 12'—11½' x 19' Rotary Filters.

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85 LB. ASCE RELAYING RAILS

2500 TONS

FOR IMMEDIATE SHIPMENT

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which we originally engineered and designed

NORTHUMBERLAND MINING COMPANY
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FIRST QUALITY — Diesel Engine-Generator Units ● Electric Motors ● Transformers ● Switch Gear ● Screw Conveyors ● Belt Conveyors ● Elevators ● Ball Mills ● Classifiers ● Thickeners ● Agitators ● Furnaces ● Boilers ● Blowers ● Cooling Flues ● Norblo Dust Arrestors ● Cyclones ● Pumps ● Pipe ● Wood Tanks ● Steel Tanks ● Laboratory Apparatus.

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Mining and Metallurgical Engineers

1206 Maple Avenue — **Los Angeles 15, California**

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2—3 Ton Battery Locos., 36" ga.
2—7½ Ton Trolley Locos., 36" ga.

CONVEYORS

1—42" x 20' Centers.
1—30" x 70' Centers.
1—20" x 40' Centers.
1—24" x 5'6" Center Dings Mag. Pulley Conveyor Feeder.

FLOTATION MACHINES

2—#24 Denver "Sub-A", 8-cell, wood tanks.

PUMPS

6—2" Wilfley Sand Pumps
2—3 x 1¼ Goulds Pyramid.
2—6" Hydroseal Pumps.
1—8" Hydroseal Pump.
Ingersoll-Rand Motor Mtd. Pumps
Peerless Deep Well Pumps.

HOISTS

1—Box Iron Wks. Sgl. Drum with 15 HP Motor.
1—#22 Vulcan with VD-6 Gas Engine.
1—25 HP H & B Converted Geared Hoist with Motor.
1—7½ HP Crow Converted, with Motor.
1—50 HP Ingersoll-Rand 3-drum Elec. Slusher.

FILTERS — DISC

1—4', 6-disc Elmco, with vacuum equipment.

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1—60" x 23' Denver Equip. Simplex Cross-Flow Classifier, with Gear Motor.
1—6' x 22' Dorr Type Duplex Rake Classifier

CONCENTRATING TABLES

1—6' x 16' Deister Type, with new rubber deck covering, riffles & motors.
2—6' x 16' Butchart, with new rubber deck covering, riffles & motors.

MISCELLANEOUS

25—Tons 85# Relayers.
1—16' x 10' Dorr Thickener.
1—I.R. Wagon Drill, pneu. tires.
1—Sullivan Wagon Drill, steel tires.
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12' x 3' Ball Mill.
1—#64 Marcy Ball Mill.
Motors—½ HP to 50 HP—AC & DC
Rock Crushers.

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1000 KW to 100 KW
STATIONARY and PORTABLE
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1—Pair Allis-Chalmers "Anaconda" Crushing Rolls, 40" x 15". Completely rebuilt and rebabbitted.
1—Kent Maxecon, Type #7, Ring Roll Mill & Drive.
1—Sturtevant, No. 2, Ring Roll Mill & Drive.
1—24" x 20" Type B Jeffrey Hammermill.

JOHNSON & HOEHLER, INC.
P. O. Box 102 Lansdowne, Pa.

4—Ball Mills 6'x6' Grate Discharge.
3—60" Akins Simplex High Weir Classifiers.
2—36" Akins Duplex-Submerged Spiral (DDPS) Classifiers.
2—Morse Bros. 8 Disc. 8'6" Dia. Filters.
8—Tyler Hummer Screens, 4x5 equipped with V-16 and V-50 units.
Miscellaneous sizes Centrifugal Pumps.
Strong Scott Unipulvo Coal Pulverizers: 1—#40; 3—#30; 1—#20.
1—Webb Corp.-Blake Type Jaw Crusher 6"x15"; Cast Iron.
New and Used Parts for 5½' Symons Short Head Crusher.
Miscellaneous Electric Motors 50 H.P. to 350 H.P., 440 volts, 3 phase, 60 cycle; 125, 150 and 200 H.P., 2,200 volts, 3 phase, 60 cycles.
3—150KV-A Allis-Chalmers Transformers Type CD; 60 cycle, single phase; voltage rating 23,000-2,300 (with voltage taps); outdoor installation.
3—G.E. Transformers, Type H. Form D M, 60 cycles, single phase 833 KV-A Continuous—55° C Rise.
Voltage Rating 23,000-2300/4000 Y.
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Heavy-duty, smooth bore, wire inserted Suction Hose. Flexible and strong. For use in mines, sewers, trenches, etc., with diaphragm pumps, pressure pumps and other contractors equipment. Prices shown include I.P.T. Couplings attached to each length.

I. D. Size and Length	Price Per Length	I. D. Size and Length	Price Per Length
1¼"x10 ft.	$ 5.00V	3"x15 ft.	$36.50
1½"x15 ft.	7.50V	3"x20 ft.	47.50
1½"x20 ft.	10.00V	*4"x10 ft.	25.00V
1½"x10 ft.	6.50V	*4"x20 ft.	68.00
1½"x15 ft.	9.00V	*5"x15 ft.	53.00V
1½"x20 ft.	14.00V	*5"x30 ft.	90.00V
2"x10 ft.	12.00V	*6"x10 ft.	90.00
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2"x20 ft.	30.25	*6"x20 ft.	161.00
2½"x10 ft.	15.00V	*I.P.T. Nipples or Couplings attached to hose.	

DISCHARGE HOSE
Stock No. CO-442-M

Cotton jacket, rubber lined hose suitable for water supply and discharge service. Constructed exactly like Fire Department hose. Light in weight. For pressures to 200 lbs. Attached to each length are Iron Pipe Thread Couplings.

Inside Diameter	Price Per 25Ft. Length	Price per 35 Ft. Length	Price per 50 Ft. Length
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3"	25.75	34.25	47.50
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2½" x 8 PLY DUCK AND CORD CONSTRUCTION SUITABLE FOR 400 LBS. WORKING PRESSURE.
For that difficult job where high pressures are encountered Carlyle offers this rugged flexible hose saving you over 50% in cost and giving dependable service for the following jobs—
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Low Priced at.....$1.00 ft. V
Available in 10-15-25-30-50 ft. Lengths. High Pressure Couplings attached as follows:

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Male and Male.....2½"I.P.T.....$10.00	
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250 Lbs. Working Pressure. Heavy-duty extremely flexible. Pneumatic Air Hose. For all Air Tools, Compressors, Chippers, Riveters, Drills and Breakers. Each length complete with Universal Air Hose Couplings attached. These Couplings are quick snap and interchangeable with Air King, Chicago, Cleveland and others.

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¾"x50 ft.	17.00
1"x25 ft.	11.00
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V—*over stocked. Drastically reduced prices to move.*
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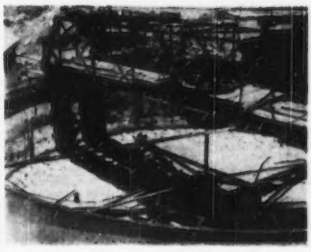

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